



GOVERNMENT OF MAHARASHTRA

**WORKING PLAN
FOR
CENTRAL CHANDA FOREST
DIVISION, CHANDRAPUR.**

FOR THE PERIOD ---2004-05 TO 2013-14

VOLUME - I

BY

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WORKING PLAN DIVISION

YAVATMAL



SUMMARY OF DRAFT WORKING PLAN REPORT OF CENTRAL CHANDA FOREST DIVISION

THE TRACT DEALT WITH

This working plan is the first consolidated working plan for all the forest areas incharge of the Forest Department in Ballarsha, Dhaba, Kothari, Rajura, Wansadi and Wirur Forest Ranges of Central Chanda Forest Division in South Chandrapur Circle.

The forest area included in this working plan is **1,14,309.4** ha, out of which **88,862.742** hectare is **Reserved Forests**, **19,647.197** hectare **Protected Forests** and **5799.46** hectares **Unclassed Forests**.

These areas lie between latitudes $19^{\circ} 31'$ to 20° North and longitudes $78^{\circ} 50' 30''$ to $79^{\circ} 45'$ East.

The boundaries of the tract dealt with are as follows :

⇒ **North** : Painganga and Wardha rivers along the Yavatmal District, Chanda and Mul Forest Ranges of Chandrapur Forest Division of Maharashtra.

⇒ **East** : Wainganga river and Andhra Pradesh.

⇒ **South** : Wardha river and Andhra Pradesh.

⇒ **West** : Andhra Pradesh, Pandharkawada and Chandrapur Forest Divisions of Maharashtra.

Configuration: The most of the forest areas of Rajura subdivision are on undulating terrain and rest are on slight undulation. The tract lies between 192.2m to 588.6m above MSL with the highest point in Manickgarh hills at Jettameda with an altitude of 588.6 m above MSL

Drainage: The tract is interspersed with big and small nalas draining into the Wardha and Wainganga rivers. Southern slopes of Manickgarh hills drain into river Godavari through small nalas.

Geology : The geological formations of the tract are as follows:

Recent to Sub-Recent – Alluvium/Laterite.

Eocene to Cretaceous – Deccan trap.

Permo-Carboniferous – Sandstone/Shale, Kamathi and Barakar Formation (Lower Gondwana) Sandy soils/Sandstone/Shale/Talchir Formation. (Lower Gondwana) Black cotton soils.

Pre-Cambrian – Shale/Sandstone/Limestone. (Vindhyan System) Loamy soils.

Climate: The climate is characterised by a hot summer, well distributed rainfall during the south-west monsoon season and general dryness except in the rainy season. Mercury reaching upto 48° Celcius during summer and dipping down to 7° Celcius in winter. The average rainfall is 1433 mm. There is no incidence of frost in the tract.

Forests: The forests of the tract dealt with under this plan belong to sub group - 5A, “**Southern Tropical Dry Deciduous Forests**”, as per the revised classification of forest types of India by H.G.Champion and S.K.Seth. Following subtypes are noticed:

Forest Types	Champion and Seth's Classification
Group	Tropical Dry Deciduous Forest
Sub-group 5 A	Southern Tropical Dry Deciduous Forest
I. Climax Types:	
(i) 5 A/C _{1b}	Dry Teak Forest
(ii) 5 A/C ₃	Southern Dry Mixed Deciduous Forests.
II. Edaphic Types:	
(i) 5/E2	Boswellia Forests.
(ii) DS1	Dry Deciduous Scrub.

LEGAL STATUS WISE FOREST AREAS

Sr.No	Legal Status	FD Territorial Area(ha)	FDCM Area(ha)	Gross area with FD Area(ha)
1	RF	88,862.742	28,785.315	1,17,648.57
2	PF	19,647.197	0.000	19,647.197
3	UF	5,799.46	0.000	5,799.46
	Total	1,14,309.399	28,785.315	1,43,094.714

Population of the district: 17.72 Lakh

Population density of the tract : 120 /sq km

District area: 10695 sq km.

Cattle population of the tract: 286417 cattle unit as per 1992 cattle census.

Administrative setup : The tract includes 6 ranges, 17 rounds and 66 beats.

PAST SYSTEM OF MANAGEMENT:

BRIEF HISTORY OF THE FORESTS : Forests of this tract derived its linkage from two distinct lineage of past history. Rajura Subdivision was part of of earstwhile Hyderabad State i.e. Nizam State while other areas were part of Central Province.

PAST SYSTEMS OF MANAGEMENT AND THEIR RESULTS :

RESERVED FORESTS : Dhaba and Kothari Ranges of this plan were combined as Dhaba Range prior to 1954 –1955 and Ballarshah Range was the part of Chanda range of West Chanda Division prior to 1965 in the past, the tract dealt with was managed range wise by separate working plans. Therefore, past systems of management is described separately for Dhaba (old) and Ballarshah ranges as follows :

DHABA RANGE (PRESENTLY DHABA AND KOTHARI RANGES) :The Reserved Forests of this tract, constituted in the year 1879, were leased out for about 20 years to purchasers and commuters was indulged in indiscriminate felling of evidently choicest species and quality. In 1899 working plan for these forests were prepared by Punnaswamy, the then Divisional Forest Officer, which was soon abandoned due to non approval of prescriptions there in by the Chief conservator of forests. Thereafter teak forests in the Wainganga tract (Presently Watrana felling series of Dhaba Range) were worked under heavy improvement fellings and the better quality mixed forests in Dhaba Range (Presently Kothari Range) under coppice with standard.

DONALD'S WORKING PLAN OF 1913 : The first regular working plan for these forest was prepared by Donald in 1913. Under this plan CWS and Improvement Felling. Areas were allotted to one felling series each. Felling cycle of 20 years was initially decided but it was raised to 40 years in the year 1924 for felling series in Dhaba Range. In the year 1927, transition felling for coppice with standard in Plain Teak Forest of Dhaba Range was introduced. In the year 1934, these areas were brought under clear felling. In 1932 a special overlapping semal felling series was formed in each range.

N.T. HUSSAIN WORKING PLAN (1937-38 TO 1946-47) The objects of management decided were to maintain the forest under the most suitable silvicultural treatment for a sustained supply of timber and other produce and to arrange to meet the local demand for grazing.

WORKING CIRCLES : The total areas of the tract were divided into four non overlapping and one overlapping working circles. These are as follows :

Conversion Working Circle.

Improvement Working Circle.

Selection Working Circle.

Miscellaneous Working Circle

Bamboo Overlapping Working Circle.

Conversion Working Circle: Watrana felling series in Dhaba Range of the tract dealt with was included under this working circle.

Conversion period : 60 years.

Site quality III

Harvestable girth 3 feet.

Periodic Blocks: 3 PBs with 20 years felling cycles. PB I defined but PB II & PB III not.

Out of 1075.269 ha, 763.641 ha area was converted.

DASHPUTRE'S (1953-54) EXTENDED TO 1973-74: Immediate objects decided were as follows :

(i) To meet the local demand for timber, fuel, minor forest produce and grazing.

(ii) To preserve the forests where necessary in the interests of conservation of soil and water supply.

(iii) To meet the demand for timber and other forest produce and to obtain the maximum sustained annual revenue, while at the same time improving the condition of the forest.

WORKING CIRCLE : To achieve the objectives as decided above the following working circles were formed.

- i) Conversion Working Circle,
- ii) Selection Cum Improvement Working Circle,
- iii) Palntation Working Circle,
- iv) Coppice With Reserve Working Circle,
- v) Khair (overlapping) Working Circle,
- vi) Semal(Overlapping) Working Circle,
- vii) Bamboo (Overlapping) Working Circle,
- viii) Miscellaneous Working Circle.

Conversion Working Circle: This working circle included teak and mixed forests of III to II quality in Dhaba Range (Watrana felling series) of the tract dealt with. Conversion Period 80

years. Harvestable girth 4 feet, Felling Cycle 20 years, Five Periodic Blocks were formed. Areas were separately allotted to Periodic Blocks I. PBI was kept separately while PB II was grouped with PBI and PB III was grouped with PB IV.

Areas regenerated during the currency of the Dashputre's plan were as under.
Out of 632.522 ha, 600.546 ha was converted.

The above together with the areas converted during the period of Shri. Tasdique Hussain's working plan amounted to the following hectareage.

Area converted from 1707.773 ha is 1364.193 ha.

B. BALLARSHAH RANGE: Ballarshah Range was formed in the year 1965. Prior to that it was the part of Chanda Range of West Chanda Forest Division. Initially W.P. was prepared by Ranges.

THE WORKING PLAN OF GANGA PRASAD (1897-1900): Ballarshah, Chanda and Moharli Ranges were part of Haveli Range. Ganga Prasad prepared the first working plan for Haveli Range for the period from 1897 to 1900. This working plan presented improvement felling. From 1924 onwards cutting back, thinning and climber cutting was done. The forest of Ballarshah Range was regularly worked.

VAHID'S WORKING PLAN (1927-37): The fundamental principle of forest management to obtain the greatest possible yield was recognised as:

- (i) To attainment of normal forest and
- (ii) To establish regeneration to the normal extent.
- (iii) Objects of management decided were :
 - (i) To obtain maximum possible sustained annual yields.
 - (ii) To supply the local demand.
 - (iii) To maintain the forest in the interest of the water supply.
- (iv) To aim at the creation of a normal forest with a normal series of age classes and with normal regeneration.
- (v) With the minimum damage of the forest and the minimum hindrance to the realisation of the above objects to provide grazing to the local cattle.

The following working circles were constituted.

- (i) High Forest Working Circle,
- (ii) Coppice With Standards Working Circle,
- (iii) Low Forest Working Circle,
- (iv) Bamboo Working Circle,
- (v) Low Forest Unworked Working Circle.

The better quality forests of Ballarshah Range were worked under low forest working circle. The remaining areas were allotted to low forest unworked working circle.

The financial rotation for miscellaneous species were fixed at 30 and 40 years for the forests of average quality of IVa and IVb respectively.

E. HEWETSON'S WORKING PLAN (1936-37 to 1945-46): Vahid's Working Plan replaced by Hewetson's Plan in the year 1936-37. Vahid's Plan was for 10 year w.e.f. 1927-28. But it was revised after completing eight years only due to failure of regeneration. The revised plan covered areas of North Chanda Forest Division and was brought into force in 1936-37. Ballarshah Range, the tract dealt with was the part of the then Chanda Range.

The main objects of management decided were:

- i) To obtain the maximum sustained yield of all classes of forest produce.
- ii) To meet the demand of the local people for different forest produce.
- iii) To retain mixture of species but to favour valuable tree species.

The following working circles were formed:

- i) High Forest Working Circle.
- ii) Coppice with Standard Working Circle.
- iii) Miscellaneous Working Circle.
- iv) Bamboo Working Circle.

The workable areas of Ballarshah Range of the tract being dealt with (Then Chanda Range) were allotted to Coppice with standard working circle.

S.N.SINGH AND R.B. MUZUMDAR'S WORKING PLAN (1949-50 to 1963-64): Singh included all R.F. areas in Ballarshah Range under management.

The objects of management decided were :

- i) To obtain the maximum sustained yield of all kinds of produce.
- ii) To satisfy the local demand for small timber, firewood and other minor forest produce and conserve as far as possible those tree species which produce edible fruits and flowers.
- iii) To provide grazing to the maximum possible extent consistent with the silvicultural requirements for maintaining the forests perpetually productive and to maintain and improve the pasture in areas specially set apart for grazing purposes.
- iv) To satisfy the local and export demands for large sized timber and export demand for firewood and charcoal.
- v) To satisfy the demand of industries for timber, bamboos and other produce.
- vi) To increase the proportion of valuable species such as teak, semal, bija, shisham etc. in the forests by the preferential treatment and planting. Pure crops were discouraged and suitable mixture was prescribed to maintain in the growing stock.
- vii) To combat the ill effects of soil erosion whenever it had started and to prescribe preventive measures against further soil erosion.
- viii) To aim at the creation of normal forest with all that it implies.
- ix) To conserve species suitable for the plywood industry wherever they occur.

The following working circles were constituted.

- i) Plantation Working Circles.
- ii) Selection Cum Improvements Working Circles.
- iii) Coppice With Reserve Working Circles.
- iv) Pasture Working Circles.
- v) Miscellaneous Working Circles.
- vi) Bamboo overlapping Working Circles and
- vii) Semal overlapping Working Circles.

The tract dealt with under this plan was allotted mainly to Coppice With Reserve Working Circle. Bamboo bearing areas were allotted to Bamboo overlapping working circle.

K.N. KHISTI'S WORKING PLAN (1979-80 to 1993-94): This plan covered Reserved Forest areas under Ballarshah, Kothari and Dhaba Ranges.

The objects of management decided were:

- (i) To mitigate the effects of soil erosion and to preserve and promote vegetative cover on precipitous hill slopes.
- (ii) To meet demand for small timber, firewood and bamboo.
- (iii) To meet the outside demand for large sized timber, firewood and charcoal to the extent the forests can bear.
- (iv) To provide grazing facilities for cattle to the extent compatible with scientific management of this forests.
- (v) To enhance potential value of the forests by raising plantations of important species particularly teak.
- (vi) To progressively increase yield of timber and firewood on sustained basis with due regard to silvicultural requirements of the forests.
- (vii) To attain normal forests.
- (viii) Consistent with above, to derive maximum financial benefits.

The following Working Circles were formed:

- (i) Conversion Working Circle.
- (ii) Coppice with Reserve Working Circle.
- (iii) Miscellaneous Working Circle.
- (iv) Bamboo overlapping Working Circle.

Conversion Working Circle: This included Watrana Felling Series of Dhaba Range and a portion of the Aksapur SCI felling series of Kothari Range under Dashputre's Plan. The objects of management decided were:

- (i) To manage the forests permanently as high forests for the production of big sized timber.
- (ii) To covert the irregular crop into the normal series of age gradation in even aged blocks.
- (iii) To secure sustained yield in perpetuity.
- (iv) To meet the demand of commerce and industry in respect to teak and other species.
- (v) Consistent with (iv), to meet the local demand for forest produce to the best possible extent without impairing the productive capacity of the forests.
- (vi) Consistent with the above to derive maximum financial benefits

Rotation period : 100 years and conversion period : 60 years.

Coppice with reserve working circle: Low quality forests of Kothari and Ballarshah Ranges were allotted to this working circle. Five felling series (already in previous plan) in Ballarshah Range and four felling series (New) in Kothari Range were formed. The main objects of management decided were:

- (i) To improve the condition, composition and density of the tree crop and ensure adequate regeneration by appropriate silvicultural system.
- (ii) To meet the local nistar demand for small timber, poles and firewood.
- (iii) To meet local requirement of fodder and grazing and

(iv) Consistent with the above to obtain maximum outturn of small sized timber and firewood, not only to meet the local demand but also for export of surplus forest produce and thereby obtaining maximum financial benefit.

Rotation for the coppice was fixed at 40 years and accordingly 40 annual coupes in each felling series were laid down. Yield was regulated by area.

WIRUR, RAJURA AND WANSADI FOREST RANGES:

The tract dealt with present day Forest Ranges : Rajura, Wansadi and Wirur were under the then Hyderabad State of Nizam. Prior to 1882, the forests were controlled by Revenue department. They had introduced a permit system. Permit holders were allowed to cut the trees for their bonafied use. Special staff was not provided to conserve the forests. The control was nominal.

In 1882 the Forest Department was constituted and forests were placed under the control of the department. Even then up to 1921 the felling were very unsystematic and consisted in removal of valuable species such as teak and bija by permit holders.

From 1921 onwards however, felling under improvised schemes were started. The systems adopted were mainly Coppice with Standard and Selection-cum-improvement felling systems.

WORKING PLAN OF S.M. RAZVI(1931-1944):

- (i) “Intensively Workable” Felling Series: 40 years rotation.
- (ii) “Experimentally Workable” Felling Series. 40 years rotation.
- (iii) “ Scrub” Felling series: 30 years rotation

Coppice-with-Reserves system was prescribed by him for all the felling series.

WORKING PLAN OF S.G.BHOGALE(1945-55 extended upto 1966-67):

- (i) Coppice with Reserves Working Circle,
- (ii) Anduk (Boswellial serrata) overlapping working circle,
- (iii) Bamboo Overlapping Working Circle,
- (iv) Plantation Overlapping Working Circle
- (v) Miscellaneous Working Circle

S.B.KULKARNI'S PLAN(1967-68 to 1981-82 extended upto 1986-87):

General objectives:

- 1) To combat the ill-effects of soil erosion and to preserve and promote soil cover on the steep and precipitous slopes.
- 2) To satisfy the local as well as out side demand of timber, firewood and charcoal to the extent the forests can bear.
- 3) To enhance the value of the forests by increasing the proportion of valuable species such as teak, bija and khair and also of the industrially important species such as eucalyptus, semal and maharukh by the preferential treatment and by plantations.
- 4) To satisfy the demand of timber, bamboos and other forest produce required by various industries.
- 5) To convert the degraded forests into pasture to supplement the increasing grazing needs.
- 6) To regulate grazing on the basis of incidence and to distribute the cattle as evenly as possible both in the interest of silviculture and of the cattle themselves.
- 7) To obtain progressively increasing yield of all kinds of forest produce.
- 8) To aim at the creation of normal forests with all that it implies.

Following working circles were formed:

- (i) Conversion Working Circle.
- (ii) Miscellaneous Plantation Working Circle.
- (iii) Selection cum-improvement Working Circle.
- (iv) Coppice with Reserve Working Circle.
- (v) Pasture Working Circle.
- (vi) Miscellaneous Working Circle.
- (vii) Bamboo (Overlapping)
- (viii) Khair (Overlapping)

Conversion Working Circle:

Rotation Period : 60 years.

Felling Cycles: 20 years.

Periodic Blocks: 3.

PB I: Clearfelling & artificial regeneration

PB II & PB III: Unallotted & Thinning and hygienic operations prescribed.

**WORKING PLAN OF S. S. MAHAJAN, R. N. BISWAS, V. B. PANDIT
and Dr. NAND KISHOR: (Period 1993-94 to 2002-2003)**

- (1) Selection cum Improvement Working Circle,
- (2) Afforestation Working Circle,
- (3) Bamboo (Overlapping) Working Circle,
- (4) Miscellaneous Working Circle and
- (5) Wildlife Overlapping Circle.

Selection cum Improvement Working Circle:

- (i) To utilize the full potential of the site for producing big sized timber and
- (ii) To improve the forests, both in composition and density by suitable tending operations and plantation.

Selection Girth for species of class I 120 cm and for species of Class II 90 cm.

Felling Cycle: 20 years and 13 felling series.

Afforestation Working Circle: The total area included in this working circle is 7113.875 hectare.

Bamboo (Overlapping) Working Circle: An overlapping bamboo working circle covering bamboo bearing forests over 29137.43 hectare 74 compartments and 6 sub compartments have been formed. (1) To meet the local demand and (2) To harvest bamboo on scientific lines so as to get the maximum sustained yield. 6 Cutting Series with 3 cutting section each have been carved.

Miscellaneous Working Circle: This working circle includes following types of areas:

- (i) Area under proposed Manickgarh Forest Park. (1,659.209Ha).
- (ii) Area under Lease. (501.960Ha).
- (iii) Area along interstate boundary dispute. **(2,016.367Ha)**.
- (iv) Areas of Manickgarh, Kawitgaon, Ahson, Kanergaon and Talodhi blocks which are mostly under encroachment and areas of Jaitapur, Naranda and Erai blocks which are totally under encroachment or cultivation. (32,751.383Ha).
- (v) Total area covered under this working circle is 37,828.919 hectare spread over 92 full compartments, 4 part compartments and 29 sub compartments

Wildlife Overlapping Circle: This overlapping working circle covers the entire area of the Rajura, Wansadi and Wirur forest ranges of this division .

Conclusions:

- (i) Absence or inadequacy of natural regeneration in areas near human habitat.
- (ii) Explosion in human and cattle population which resulted in increasing the pressure on the forests by many folds and thus accelerated the process of degradation of forests. The executive agency cannot check this degradation due to its various limitations.
- (iii) Improper or inadequate execution of prescriptions of the plan.
- (iv) Illiteracy and lack of knowledge among the population regarding the science of silviculture and intangible benefits of the forests.
- (v) Lack of motivation of people in participation of development of common resources i.e. forests.
- (vi) Last but not the least the poverty of the major part of the population.

STATISTICS OF GROWTH AND YIELD:

GROWTH OF TEAK : During the preparation of this plan stem analysis of 6 teak trees from Watrana forests were carried out by the team of working plan division Yavatmal. The data so collected site quality wise and are given in appendix of this plan report.

CAI and MAI curve for II/III intersect each other at the age of 75 year and average volume per tree is 1.22 cubic meter which corresponds mean and current annual increment to 0.016 cubic meter per year and gbh 142.3 centimeter. CAI and MAI curve for III intersect each other at the age of 75 year and average volume per tree is 0.80 cubic meter which corresponds mean and current annual increment to 0.0106 cubic metre per year and gbh 122 centimetre. During the preparation of working plan of Pandharkawada Forest Division stump/stem analysis had been carried out by the DCF WP Yavatmal during 1999-2000. 10 Trees each from III/IV and IV of all India Teak Site Qualities were selected from Parwa, Umari and Pandharkawada Ranges and analysed. It is seen that CAI and MAI curves for III/IV and IV teak site qualities cut in the 75th and 50th years, which correspond to 98.9 cms and 73 cms g.b.h.(o.b.) with corresponding current annual increments (c.a.i.) 0.0072 cubic meter/year and 0.0053 cubic meter/year respectively. Data for other species are collected from various working plans.

WILDLIFE PRESERVATION: The wild animals of which the tract was once proud of, are becoming the vanishing asset of the tract. However, even today these forests shelter a variety of wild animals, birds, reptiles etc. but in very less numerical strength. In this tract following wild animals are found: Tiger, panther, Bison, Sambhar, Chital, Nilgai, Bear, Wildboar, Hares, Peafowl, Forest Jungle fowl, Titar, Bater, Cat, Civeat cat, Common Langoor, varieties of snakes and other species of animal and plants. Wildlife was protected from time to time as per the Shikar needs of earstwhile princeley states and the law made thereupon. Now wild life act 1972 in its revised form totally prohibits shikar of wildlife. Due to not having any management, some wildlife has reached to on the verge of disappearance. The condition of naturally existing, basic needs (food, water and shelter) have deteriorated sharply and to maintain and develop them nothing has been done substantially so far.

PART II

FUTURE MANAGEMENT PRESCRIBED AND MODE OF EXECUTION

Inclusion of all Reserved Forests, Protected Forests and Unclassed Forests in incharge of present Central Chanda Forest Division (Territorial). Wherever necessary new compartments were given treating each compartment and part of compartment as separate identity and as single unit. The entire area was scanned on GIS and accordingly planimitted area was calculated with the help of specific software. Also vegetal cover with the help of enumeration carried out and satellite imageries were used as the tool for density wise area distribution.

Following Working Circles have been carved out.

- (1) Selection cum Improvement Working Circle.
- (2) Afforestation Working Circle.
- (3) Improvement Working Circle.
- (4) Old Teak Plantation Working Circle.
- (5) Fodder working Circle
- (6) Bamboo Overlapping Working Circle.
- (7) Non Wood Forest Produce and Medicinal Plant Working Circle.
- (8) Wildlife Protection (Overlapping) Working Circle.
- (9) Miscellaneous Working Circle.

SrNo	WORKING CIRCLE	NO OF COMP	NOTIFIED AREA (HA)
1.	Selection cum Improvement Working Circle	220	46,040.147
2.	Afforestation Working Circle	92	22,101.912
3.	Improvement Working Circle.	52	11,366.263
4.	Old Teak Plantation Working Circle	132	9204.392
5.	Fodder working Circle.	144	20544.14
6.	Bamboo Overlapping Working Circle	165	20,553.481
7.	Non Wood Forest Produce and Medicinal Plant Working Circle	556	1,14,309.399
8.	Wildlife Protection (Overlapping) WC.	556	1,14,309.4
9.	Miscellaneous Working Circle.	27	5,052.545
	Working Plan Area	556	1,14,309.4
	Area Managed by FDCM	108	2,8785.315
	Total:	664	1,43,094.714

(1) Selection Cum Improvement Working Circle.

No of compartments	=	151 Full, 69 Part = 220
Area	=	46040.147 ha.
Felling cycles	=	20 years.
No of Working Series	=	15
No of coupes in each working series	=	20
Average area of coupe	=	150 ha.

(A) Site Quality II/III : Harvestable Girth : 135 cms. trees per hectare or of harvestable trees per hectare, whichever is less, is to be marked for felling.

(B) Site quality III

Harvestable girth = 120 cm.

(C) Site quality III/IV.

Harvestable girth = 105 cm.

(D) Site quality IV.

Harvestable girth = 90 cm.

Treatments – Area will be demarcated one year advance of the main working.

Grid of 100m x 100m will be laid down to divide the area into the grid of 1 ha each.

Each grid will be treated separately. Treatment for each grid will be given as per the area and existing crop.

Enumeration: Enumeration of each tree including regeneration status in a particular grid will be carried out and inventory of the same will be prepared.

Treatment map

Areas A - Protection areas

- Steep slope.
- Buffer area

B - Understocked area density < 0.4 and extent > 0.5 ha at a place.

C - Pole crop and old plantation not covered in old plantation working circle.

D - Well stocked area density > 0.4

Effective nala bunding and gully plugging to the extent as per site requirement and sanctioned by the competent authority.

A - Area - No felling.

B - Area - Teak and suitable miscellaneous species to be planted, removal of dead dying trees irrespective of girth classes.

C - Area –In general no planting but thinning to the young crop will be carried out as per the prescriptions given in Most Important Other Regulations.

D -Area In general no planting will be done but felling will be done as per the marking rule, removal of dead dying trees irrespective of girth classes.

Marking rule.

A - No tree will be marked for felling.

B - All dead, dying and malformed trees except 2 trees/ha will be marked for felling. All high live stump to be cut as clear to ground as possible. Malformed seedlings to be cut back and established multiple coppice shoots and pole will be reduced to one per stool retaining the vigorous one.

C - As per the thinning rule thinning will be carried out. The dead, dying, diseased and malformed poles will be marked for thinning first and then the remaining.

D - i) Climber to be cut.

ii) If required, multiple coppice tree/pole to be marked to reduce the number of stem one per stool.

iii) No tree for marking unless it is silviculturally available.

iv) Teak trees preferably coppice origin to be marked for felling as per yield regulation.

v) Miscellaneous trees will be marked for felling as per the requirement.

vi) Irrespective of girth class all malformed, dead trees will be marked for felling retaining two dead trees per ha.

vii) Undesired growth preventing or likely to prevent the development of seedling of regeneration of the desired species will be removed.

viii) Thinning in other girth classes will be carried out, if necessary.

Regeneration :-

Natural Regeneration will be encouraged by giving special treatment to young recruits so that they will be established. Complete protection from fire and grazing and soil working around the young recruits will be sufficient to achieve the objective. While cut back operation and other silvicultural works will keep the health of the forest in good shape.

Artificial Regeneration: a) In under stocked and blank areas and the areas where natural regeneration fails to come, artificial regeneration will be introduced.

b) Canopy removal :- Nearly 250 ha. area will be selected for planting teak by removing canopy, as per the condition enlisted by GOI.

(2) Improvement Working Circle :-

Area	=	11,366.263 ha.
No. of Compartments	=	37 Full, 15 Part=52
No of Working series	=	6
No of coupes	=	20
Average area	=	100 ha.

(3) Afforestation Working Circle :-

Area	=	22,101.912 ha.
No. of Compartments	=	79 Full, 13 Part=92
No of Working series	=	7
No of coupes	=	30
Average area	=	100 ha.

Objective :-

- i) To check loss of top soil by adopting suitable soil moisture Conservation measures.
- ii) To increase the water absorption/retention capacity of the soil.
- iii) To control the biotic pressure.
- iv) To increase the vegetal cover in the area.
- v) To increase the productivity of the land.

Yield -No specific yield regulation.

(4) Old Teak Plantation Working Circle:- The area earlier converted to teak plantation in conversion working circle or otherwise is included in it. It will be treated as per the requirement to teak plantation. Thinning of the crop at regular intervals and improvement of the crop to achieve the aim of conversion.

Area	=	9,204.392 ha.
No. of Compartments	=	19 Full, 113 Part=132
No of Working series	=	1
No of coupes	=	10
Average area	=	920 ha.

(5) Fodder Working Circle:-

Area	=	20,544.14 ha.
No. of Compartments	=	120 Full,24 Part=144
No of Working series	=	11
No of section	=	A,B,C,D,E,F
Average area of section	=	300 ha.

(6) Bamboo Overlapping Working Circle:-

Area	=	20,553.481 ha.
No. of Compartments	=	165
No of Working series	=	11
No of coupes	=	A,B,C
Average area	=	3000 ha.

(7) Non Wood Forest Produce and Medicinal Plants Overlapping Working Circle:-

Area	=	1,14,309.399 ha.
No. of Compartments	=	556
No of Working series	=	6
No of coupes	=	6
Average area	=	Range Area

(8) Wildlife Protection (Overlapping) Working Circle:- Many kinds of wildlife are found in this tract of forests. Though these forests are out side the PA (Protected Areas) wildlife do not know the legal boundary. To have better health and protection of protection of wildlife

this overlapping wildlife protection working circle has been carved out. This encompasses maintenance of biodiversity.

Area	=	1,14,309.399 ha.
No. of Compartments	=	556
No of Working series	=	6
No of coupes	=	6
Average area	=	Range Area

(9) Miscellaneous area which are not allotted to any Working Circle :-

No of compartments	=	18 full , 9 Part =27
Area	=	5,052.545 ha.

The areas which are mostly under border disputes, lease & park area have been carved under this working circle. Most of the areas have been handed over to the other department prior or later to 1980 but they have not yet been legally disforested, other areas being utilised as nurseries forests parks, quarters, inspection hut etc, hence no treatment has been prescribed for these area. However survey and demarcation and mapping work shall be carried out as per the programme given under section Survey and Demarcation in most important regulations.

Others Important Regulations :-

- 1)Demarcation and Marking.
- 2)Harvesting and Disposal of Forest Produce.
 - Timber and Fire Wood.
 - Tendu leaves.
 - Grazing
- 3). Irregular harvesting.
 - 1) Survey and demarcation of areas and Boundaries Maintenance
 - 2) Fire protection.
 - 3) Grazing control.
 - 4) Watershed approach.
 - 5) Deviations.
 - 6) Soil and Moisture conservation.
 - 7) Miscellaneous Areas Statement .
 - 8) Forestry Extention.
 - 9) Survey and Maps.
 - 10) Position of Encroachments.

Control and Records. I	=	Control & Records.
II	=	Compartment History.
III	=	Plantation and Nursery Register.
IV	=	Divisional Note Book.

Financial Forecast: As follows:

Implementation of prescriptions of this draft plan will require expenditures to be incurred and will also generate revenue to the State and employment to the local people. The details of these have been discussed in draft plan.

The cost of preparation of the Working Plan for Central Chanda Forest is Rs.15.5 per hectare.

PREFACE

This revised Working Plan of Central Chanda Forest Division covers the whole area of the Division, which was earlier managed under two working plans, one for Dhaba, Kothari and Ballarsha ranges by Mr. K.N.Khisti and other for Rajura, Wansadi and Wirur range by Dr. Shri. Nandkishor and Shri. S.S.Mahajan, Shri. R.N.Biswas, Shri. V.B.Pandit. Shri. R.S. Yadav along with Shri. G.P.Garad has made an enormous efforts in writing this plan, which has many unique features. The foremost of this important feature is the provision of normalcy in the selection forests. The forests will no longer be harvested mechanically by removing the trees above harvestable girth, but the removal shall be from all the girth classes, depending on its preponderance in that class. The trees in its distribution will be allowed to attain normalcy, that is, the distribution of the Trees in each girth class shall follow the geometrical proportion. This is according to Delicourt formula, usually assumed true for the conifer forests. Shri.R.S.Yadav, has also develop his own stand table for these forests, by distributing the entire volume of the trees of the F.R.I. yield table into eight equal classes. Where by reducing 16 girth class of F.R.I. publication to his own eight girth classes. The another important feature of this plan is the introduction of teak plantation, by the canopy removal of the selected trees, from the suitable area, on the line of permission granted to F.D.C.M. Ltd. by the GOI, in its Ministry of Environment and Forest. A chapter on fodder development for the local people has also been introduced. Another important feature of the exercise, is that work of GIS by these officers in their office. The entire work of registration and digitisation of central Chanda Division has been done in office of Dy.C.F. (WP),Yavatmal which is a great achievement. The entire work was completed in a record time. This has developed an expertise in the department. The entire exercise involves and tremendous efforts of collecting land records.

I congratulate Shri. R.S.Yadav, and Shri. G.P.Garad, for its magnificiant efforts, in writing this unique plan.

Date :

Place: Nagpur.

(Shailendra Bahadur)
Conservator of Forest,
Working Plan Circle,Nagpur.

PREFACE

The tract dealt with in this Working Plan of Central Chanda Forest Division comprises of Six Ranges. They are--

1)Rajura 2) Wirur 3) Wansadi 4) Dhaba 5) Kothari 6) Ballarsha

Previously these areas were covered under two working plans i.e. one for Dhaba, Kothari, Ballarsha by Mr. K.N.Khisti and other for Rajura, Wirur, Wansadi by Dr. Shri. Nandkishor and Shri.S.S.Mahajan, Shri.R.N.Biswas, Shri.V.B.Pandit. Shri.K.N.Khisti's W.P. included the area of Dhaba, Kothari, Ballarsha ranges. It was in operation from 1979-80 to 1993-94. While DR. Nandkishor's W.P. was in operation from 1994 -95 to 2002-03 for the remaining areas.

The first P.W.P.R. was submitted by Shri. R.S.Yadav. Areas handed over to F.D.C.M. were excluded from management prescriptions. Accordingly allocation of areas to various working circles was done with due analysis of the crop and field inspections.

The State Level Committee meeting was held on 20th February 2002. Detailed discussions were held on various aspects and it was approved with some minor changes and with the suggestions.

Shri. B.P.Singh and Shri. R.S.Yadav had written the proposed working plan except the reorganization of working circles, working series and respective coupes. The undersigned with the help of valuable guidance of Shri. Shailendra Bahadur, I.F.S. Conservator of Forests Working Plan Circle, Nagpur organized the various working circle, working series and coupes.

Shri. Shailendra Bahadur, I.F.S. Conservator of Forests, Working Circle took keen interest in the preparation of this plan. Shri. V.T.Patki, I.F.S. then Conservator of Forests, South Chanda and Shri. B.S.K.Reddy, I.F.S. Conservator of Forest, South Chanda Circle also took interest in the preparation of this plan and gave their valuable suggestions. All of them deserve thanks for their valuable suggestion and cooperation. Shri. M.S.Reddy, I.F.S. then Dy. Conservator of Forests, Central Chanda Forest Division and Shri. B.S.Huda, I.F.S. Dy. Conservator of Forests, Central Chanda Forest Division also deserves thanks for their full cooperation during all the field works and providing required basic information pertaining to the Central Chanda Forest Division. I also extend my sincere thanks to all A.C.F.s and R.F.O.s and field staffs of Central Chanda Forest Division for their personal interest and cooperation extended by them to the staff of this division during their enumeration work and stem analysis and other works.

I am also thankful to the entire team of staffs at Working Plan Division, Yavatmal who took the challenge of preparing this working plan and cooperated whole heartily.

Following names need special mention for their contribution.

- | | | |
|----|---------------------|-----------------------|
| 1. | Shri. P. N. Patil, | Range Forest Officer. |
| 2. | Shri. S.S.Wankar, | Range Forest Officer. |
| 3. | Shri. R.D.Wajurkar, | Range Forest Officer. |
| 4. | Shri. J.B.Nandekar, | Ranger Surveyor. |
| 5. | Shri. V. A. Masram, | Surveyor. |
| 6. | Smt. P. V. Pathade, | Steno-Typist. |
| 7. | Shri. S. G. Atram, | Clerk cum Typist. |

I am also thankful to the following officer staffs at the office of Conservator of Forest, Working Plan Circle, Nagpur who took interest in using G.I.S. softwares and worked for digital Data Base.

- | | | |
|----|----------------------|-----------------------|
| 1. | Shri. B.V. Selukar, | Range Forest Officer, |
| 2. | Shri. R.T. Dhabekar, | Range Forest Officer. |

Dated :

Place : Yavatmal.

(G.P.Garad)
Deputy Conservator Of Forests
Working Plan Division,
Yavatmal

CENTRAL CHANDA FOREST DIVISION CHANDRAPUR

C O N T E N T S

SUBJECT	PAGE NUMBER
Summary of the DWPR for Central Chanda Division	i - xiv
Preface	A - C
Contents	I - VI
Abbreviations used in the Plan	VII - VIII
Glossary of Local Names	IX - X
Local and Botanical names of Occurring in Central Chanda Division	XI - XIV
Local and Botanical names of Plants and Medicinal Plants	XV - XVI
Common and Zoological names of the Animals and Birds commonly found in Central Chanda Division	XVII - XIX
CHAPTER - I THE TRACT DEALT WITH	1 - 18
Section 1.1 : Name and situation	1 - 1
Section 1.2 : Configuration of the ground	1 - 2
Section 1.3 : Geology, Rock and Soil	2 - 4
Section 1.4 : Climate	4 - 8
Section 1.5 : Water Supply	8 - 8
Section 1.6 : Distribution of Area	8 - 9
Section 1.7 : State of Boundaries	9 - 10
Section 1.8 : Legal Position	10 - 16
Section 1.9 : Rights and Concessions	16 - 18
CHAPTER - II THE FOREST	19 - 24
Section 2.1 : The Composition and condition of the Crop.	19 - 22
Section 2.2 : Injuries to which the crop is liable.	22 - 24
Section 2.3 : Soil Erosion.	24 - 24
CHAPTER - III UTILISATION OF THE FOREST PRODUCE	25 - 33
Section 3.1 : Agricultural Customs and Wants of Populations.	25 - 29
Section 3.2 : Market and Marketable Products	29 - 30
Section 3.3 : Lines of Transport	30 - 31
Section 3.4 : Methods of Harvesting & their cost	31 - 32
Section 3.5 : Past and Current Prices.	32 - 32
CHAPTER - IV STAFF AND LABOUR SUPPLY	33 - 34
Section 4.1 : Staff	33 - 34
Section 4.2 : Labour Supply.	34 - 34
CHAPTER - V PAST SYSTEM OF MANAGEMENT	35 - 82
Section 5.1 : General History of the Forest.	35 - 35
Section 5.2 : Past system of the Management and their results	35 - 60
Section 5.3 : Analysis of past system of the Management and conclusion drawn.	60 - 63
Section 5.4 : General History of the Forest.	64 - 77
Section 5.5 : Plan for period 1993-94 to 2002-03	77 - 82
Section 5.6 : Past Yield.	82 - 82
Section 5.7 : Past Revenue & Expenditure.	82 - 82

CHAPTER VI	STATISTICS OF GROWTH AND YIELD.	83 - 104
Section 6.1 :	Statistics of rate of growth of teak & Miscellaneous Species.	83 - 97
Section 6.2 :	Estimation of Growing stock	97 - 103
Section 6.3 :	Yield	103 - 103
CHAPTER VII	ESTIMATE OF CAPITAL VALUE OF FOREST IN TERMS OF TANGIBLE & IN TANGIBLE BENEFITS	104 - 104
Section 7.1 :	General Observation	104 - 104
CHAPTER VIII	WILD LIFE PRESERVATION.	105 - 112
Section 8.1 :	General History of the Wildlife	105 - 105
Section 8.2 :	Distribution of the Wildlife	105 - 106
Section 8.3 :	Past Management of Wildlife & its results.	106 - 107
Section 8.4 :	Legal Provision for wildlife protection.	107 - 110
Section 8.5 :	Rights and Concessions.	110 - 110
Section 8.6 :	Injuries to wildlife.	110 - 110
Section 8.7 :	Other Measures adopted & Efforts Made for protecting Wildlife.	110 - 111
PART – II		112 - 112
FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED		
CHAPTER- I	BASIS OF PROPOSALS	113 - 121
Section 1.1 :	National Forest Policy	113 - 115
Section 1.2 :	Classification of Forests.	115 - 116
Section 1.3 :	Factors Influencing the General Objects of Management	116 - 117
Section 1.4 :	General Object of Management	117 - 118
Section 1.5 :	Method of Treatment to be adopted.	118 - 119
Section 1.6 :	Analysis and valuation of the Crop.	119 - 120
Section 1.7 :	Working Circle.	120 - 120
Section 1.8 :	Block and Compartments.	120 - 121
Section 1.9 :	Period of the Plan.	121 - 121
CHAPTER- II	WORKING PLAN FOR THE SELECTION CUM IMPROVEMENT WORKING CIRCLE	122 - 140
Section 2.1 :	General Constitution.	122 - 122
Section 2.2 :	General Character of the Vegetation.	122 - 123
Section 2.3 :	Compartments and Felling Series.	123 - 123
Section 2.4 :	Special Object of Management.	123 - 123
Section 2.5 :	Analysis and Valuation of the Crop.	123 - 124
Section 2.6 :	Harvestable Girth	124 - 124
Section 2.7 :	Structure & Silvicultural System.	124 - 125
Section 2.8 :	Choice of Species.	125 - 125
Section 2.9 :	Formation of Felling Series & Coupes.	125 - 125
Section 2.10 :	Regulation of Yield.	126 - 126
Section 2.11 :	Yield Calculation.	126 - 135
Section 2.12 :	Agency of Harvesting.	135 - 135

Section 2.13	:	Demarcation of Coupes and Treatment Map	136 - 138
Section 2.14	:	Soil & Moisture Conservations Works.	138 - 138
Section 2.15	:	Method of Regeneration.	139 - 139
Section 2.16	:	Subsidiary Silvicultural Operations.	139 - 140
Section 2.17	:	Other Regulations.	140 - 140
CHAPTER –III:		WORKING PLAN FOR IMPROVEMENT	
		WORKING CIRCLE	141 - 144
Section 3.1	:	General Constitution of the Working Circle.	141 - 141
Section 3.2	:	General Character of the Vegetation.	141 - 141
Section 3.3	:	Special object of Management.	141 - 141
Section 3.4	:	Compartment of and Working Series	141 - 141
Section 3.5	:	Analysis and Valuation of the Crop.	142 - 142
Section 3.6	:	Silvicultural System	142 - 142
Section 3.7	:	Working Cycle & Harvestable Girth	142 - 142
Section 3.8	:	Choice of Species.	142 - 142
Section 3.9	:	Formation of Working Series & Coupes.	142 – 142
Section 3.10	:	Regulation of Yield	142 - 142
Section 3.11	:	Agency for Harvesting.	142 - 142
Section 3.12	:	Demarcation of coupe,preparation of treatment	143 - 144
Section 3.13	:	Subsidiary silvicultural operations.	144 - 144
Section 3.14	:	Other Regulation.	144 - 144
CHAPTER - IV		WORKING PLAN FOR OLD TEAK PLANTATION	
		WORKING CIRCLE.	145 - 150
Section 4.1	:	General Constitution.	145 - 145
Section 4.2	:	General Characters of the Vegetation.	145 - 145
Section 4.3	:	Block & Compartments.	145 - 145
Section 4.4	:	Special Objects of Management.	145 - 145
Section 4.5	:	Analysis and valuation of the crop.	146 - 146
Section 4.6	:	Treatment Map.	146 - 146
Section 4.7	:	Silvicultural operations.	146 - 147
Section 4.8	:	Working Circle.	147 - 147
Section 4.9	:	Working Series and coupes.	147 - 147
Section 4.10	:	Method of Executing Thinning.	147 - 150
Section 4.11	:	Agency for Execution	150 - 150
Section 4.12	:	Other Regulations.	150 - 150
CHAPTER- V		WORKING PLAN FOR THE AFFORESTATION	
		WORKING CRICLE	151 - 157
Section 5.1	:	General Constitution.	151 - 151
Section 5.2	:	General Character of Vegetation.	151 - 151
Section 5.3	:	Blocks and Compartments	152 - 152
Section 5.4	:	Special objects of Management.	152 - 152
Section 5.5	:	Analysis and valuation of the crop.	152 - 152

Section 5.6	:	Silvicultural System.	152 – 152
Section 5.7	:	Choice of Species.	153 – 153
Section 5.8	:	Formation of Coupes.	154 - 154
Section 5.9	:	Regulation of Yield.	154 – 154
Section 5.10	:	Agency of Working.	154 –154
Section 5.11	:	Demarcation of Coupe, Preparation of Treatment Map.	154 - 155
Section 5.12	:	Soil and Moisture Conservation.	155 – 156
Section 5.13	:	Planting Technique.	156 – 156
Section 5.14	:	Subsidiary Silvicultural Operations.	156 – 157
Section 5.15	:	Other Regulations.	157 - 157
CHAPTER -VI		WORKING PLAN FOR MISCELLANEOUS WORKING CIRCLE.	158 - 158
Section 6.1	:	Other Regulation	158 - 158
CHAPTER-VII :		WORKING PLAN FOR THE BAMBOO (OVERLAPPING WORKING CIRCLE .	159 – 164
Section 7.1	:	General Constitution.	159 - 159
Section 7.2	:	General Character of the Vegetation	159 - 159
Section 7.3	:	Local and Commercial Demand.	160 - 160
Section 7.4	:	Blocks and Compartments.	160 - 161
Section 7.5	:	Special Objects of Management.	161 – 161
Section 7.6	:	Methods of Treatment.	161 – 161
Section 7.7	:	Cutting Cycle.	161 – 161
Section 7.8	:	Analysis and Valuation of the Crop.	161 – 161
Section 7.9	:	Identification of Age of Bamboo.	161 – 161
Section 7.10	:	Agency for Harvesting.	161 – 161
Section 7.11	:	Methods of Executing the Treatment.	162 – 162
Section 7.12	:	Methods of Working.	162 – 163
Section 7.13	:	Bamboo Flowering and Treatment to Gregariously Flowered Area.	163 --164
Section 7.14	:	Cycle of Tending Operations.	164 – 164
Section 7.15	:	Injuries due to Insects and Their Control.	164 – 164
Section 7.16	:	Other Regulation.	164 – 164
CHAPTER-VIII :		WORKING PLAN FOR NON-TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE.	165 - 177
Section 8.1	:	General Constitution of the Working Circle.	165 - 165
Section 8.2	:	Non Timber Forest Produce of the Tract.	165 - 165
Section 8.3	:	Special Objects of Management.	165 - 165
Section 8.4	:	Methods of Treatment.	165 - 176
Section 8.5	:	Research Works.	176 - 176
Section 8.6	:	Other Important Principles and Procedures.	176 - 177

CHAPTER-IX :	WORKING PLAN FOR WILDLIFE (OVERLAPPING)	
	WORKING CIRCLE.	178 - 180
Section 9.1 :	General Constitution of the Working Circle.	178 - 178
Section 9.2 :	General Condition of Fauna and Flora.	178 - 178
Section 9.3 :	Special Objects of Management.	178 - 178
Section 9.4 :	Methods of Treatment.	178 - 179
Section 9.5 :	Creation of Water Holes.	179 - 180
Section 9.6 :	General Measures for Protection.	180 - 180
CHAPTER-X :	WORKING PLAN FOR FODDER	
	WORKING CIRCLE.	181- 184
Section 10.1 :	General Constitution.	181 - 181
Section 10.2 :	General Characters of the Vegetation.	181 - 181
Section 10.3 :	Special objects of Management.	181 - 181
Section 10.4 :	Compartment and Working Series.	181 - 181
Section 10.5 :	Analysis and Valuation of the Crop.	181 - 183
Section 10.6 :	Method of Treatment.	183 - 184
Section 10.7 :	Formation of Coupes for Rotational Grazing.	184 - 184
Section 10.8 :	Implementing Agency.	184 - 184
Section 10.9 :	Soil and Moisture Conservation Works.	184 - 184
Section 10.10 :	Regeneration.	184 - 184
Section 10.11 :	Other Regulations.	184 - 184
CHAPTER-XI :	WORKING PLAN FOR OTHER IMPORTANT	
	REGULATIONS.	185 - 213
Section 11.1 :	Demarcation of Coupe and Preparation of Treatment Map.	185 - 186
Section 11.2 :	Harvesting and Disposal of Forest Produce.	186 - 187
Section 11.3 :	Irregular Harvesting.	187 - 188
Section 11.4 :	Scattered Bamboo area management	188 - 188
Section 11.5 :	Maintenance of Boundaries.	188 - 190
Section 11.6 :	Forest fire and Protection Measures.	190 - 198
Section 11.7 :	Natural Regeneration.	198 - 199
Section 11.8 :	Artificial Regeneration.	199 - 201
Section 11.9 :	Soil and Moisture Conservation.	201 - 202
Section 11.10 :	Grazing Control.	202 - 203
Section 11.11 :	Requirement of the People for various Forest Produce.	203 - 204
Section 11.12 :	Illicit Cutting.	204 - 205
Section 11.13 :	Deviations.	205 - 205
Section 11.14 :	Roads, Cart Tracts & Culverts.	205 - 205
Section 11.15 :	Buildings.	206 - 206
Section 11.16 :	Water supply.	206 - 206
Section 11.17 :	Privileges and Concessions for Forest Produce.	206 - 206
Section 11.18 :	Survey and Maps.	206 - 207
Section 11.19 :	Encroachments.	207 - 207
Section 11.20 :	Beat Checking.	207 - 208

Section 11.21 :	Charcoal Kilns.	208 - 208
Section 11.22 :	Preservation of Wildlife.	208 - 209
Section 11.23 :	Medical Facilities.	209 - 209
Section 11.24 :	Transit Rules for Forest Produce.	209 - 209
Section 11.25 :	Rain Gauge and Temperature Recording Centers.	209 - 209
Section 11.26 :	Saw Mills.	209 - 210
Section 11.27 :	Camping Sites.	210 - 211
Section 11.28 :	Socio – Economic Development.	211 - 211
Section 11.29 :	Suggestions for Improvement in Development.	211 - 213
CHAPTER-XII :	ESTABLISHMENT AND LABOUR.	214 - 214
Section 12.1 :	Staff.	214 - 214
Section 12.2 :	Labour Supply.	214 - 214
CHAPTER-XIII :	CONTROL AND RECORDS.	215 - 216
Section 13.1 :	Control and Records.	215 - 216

ABBREVIATIONS USED IN THE PLAN

AC/ac	:	Acre
ACF	:	Assistant Conservator of Forests
AR	:	Artificial Regeneration
AD	:	Anna Domini (After Christ)
a.m.s.l.	:	above mean sea level
Av	:	Average
b.h.o.b.	:	breast height over bark
C.A.I./cai	:	Current Annual Increment
C.B.O	:	Cutting Back Operation
°C	:	Degree Celcius
cm	:	Centimetre
C.W.R.	:	Coppice With Reserve
C.C.T.	:	Continuous Contour Trench
cum	:	Cubic Metre
Comptt.	:	Compartment
d.b.h.o.b.	:	diameter at breast height over bark
d.b.h.u.b.	:	diameter at breast height under bark
D.C.F.	:	Deputy Conservator of Forests
D.F.O.	:	Divisional Forest Officer
Dt	:	Dated
DF	:	Disforrested.
Dn.	:	Division
E.G.S.	:	Employment Guarantee Scheme
F.A.O.	:	Food and Agriculture Organisation
D.F	:	Degree Fahrenheit
F.D.C.M.	:	Forest Development Corporation of maharashtra Limited.
F.L.C.S.	:	Forest Labourer's Co-operative Society
FRSS	:	Forest Resources Survey Scheme
F.S.	:	Felling Series
F.R.H.	:	Forest Rest house
F.S.O.	:	Forest Settlement Officer
F.V.	:	Forest Village
F.Y.O.	:	First Year Operation
Govt	:	Government
g.b.h.	:	Girth at breast height
g.b.h.o.b.	:	Girth at breast height over bark
g.b.h.u.b.	:	Girth at breast height under bark
ha	:	Hectare
hrs	:	hours
ht	:	height
i.e.	:	that is
I.G.F.	:	Inspector General of Forests
Km.	:	Kilometer

Kg	:	Kilogramme
m	:	Meter
mm	:	Millimeter
Max	:	Maximum
Min	:	Minimum
M.A.I.	:	Mean Annual Increment
M.F.P.	:	Minor Forest Produce
M.S.L.	:	Mean Sea Level
M.T.	:	Metric Tonne
N.A.	:	Not Available
N.T.F.P.	:	Non Timber Forest Produce
N.R.	:	Natural Regeneration
No.	:	Number
P.A.	:	Protection Area
P.A.I.	:	Periodic Annual Increment
PB	:	Periodic Block
P.F.	:	Protected Forest
P.P.O.	:	Pre Planting Operation
P.Y.O.	:	Preliminary Year Operation
P.W.D.	:	Public Works Department
o/o	:	Percentage
SQ	:	Site Quality
R.F.	:	Reserved Forest
R.F.O.	:	Range Forest Officer
Rs	:	Rupees
Sec	:	Section
Sq	:	Square
Sr	:	Serial
S.C.I.	:	Selection Cum Improvement
S & M	:	Soil and Moisture
S.O.F.R.	:	Survey of Forest Resources
S.Y.O.	:	Second Year Operation
T	:	Timber
Temp	:	Temperature
T.Y.O.	:	Third Year Operation
Vol.u.b.	:	Volume under bark
W.C.	:	Working Circle
w.r.t.	:	with respect to
WS	:	Working series
IV th Y.O.	:	Fourth Year Operation

GLOSSARY OF LOCAL NAMES

Adjat	:	Miscellaneous Species
Bakhar	:	Agricultural instrument
Bidi	:	Hand made cigarette wrapped in tendu leaf
Chanda	:	Chandrapur
Dandi	:	Agricultural instrument
Doh	:	A deep pond in a river or stream
Bora	:	Agricultural instrument
Gadh	:	Fort
Geru	:	Red Ochre or Red earth
Ghat	:	A Road with a Steep Gradient
Gairan	:	A Place for Herding Cattle
Gaothan	:	A Site Kept Reserved for Housing
Gully	:	Channel
Jagir	:	An estate conferred by the state in return for services.
Jagirdar	:	The holder of jagir
Jamindar	:	The Holder of Zamin i.e. land
Jhiras	:	Temporary Small Well Dug in Nalas During Summer
Juar	:	A cultivated millet
Jungle	:	Forest
Kacha road	:	Temporary road
Kankar	:	Lime nodules
Karka	:	Whippy bamboo
Katha	:	Catechu
Kopar	:	Agricultural instrument
Kharif	:	Monsoon Crop
Khasara No.	:	Serial number given to any portion of land entered in land Records
Khories	:	Valleys in between two hills
Malguzari	:	Land tenure system which existed in Vidarbha
Malki Lands	:	Lands belonging to private individuals
Mouza	:	A village Area
Mandav	:	A shade
Murram	:	A Reddish Hard Soil
Naka	:	Barrier on road for checking forest produce in transit
Nala	:	A Water Course
Nadi	:	River
Nistar	:	Forest produce required for bonafide agriculture or domestic purposes
Nistar Patrak	:	Record of Rights on Government land
Occupational	:	The nistar granted to village craftsman i.e. Mahar, Chambhar, Lohar etc. at concessional rates for purposes of their Craft.
Padit	:	A barren or Waste land

Paidawar	:	Wild edible flowers, fruits or roots
Patwari/Talathi		Village Revenue Officer
Patta	:	A Sanad granted for use of land
P.C.No.	:	Patwari Circle number
Pucca	:	Permanent Construction
Pulla	:	Bundles of Cut Grass
Rabi	:	Winter Crop
Rahadari	:	Transit
Raiyatwari	:	A form of land tenure, applied to land in raiyatwari tenure and to villagers.
Ramna/Kuran		A Grass Reserve Close to Grazing
Regur	:	Black Cotton Soil
Rith	:	A Deserted Village Site
Satkatha	:	Miscellaneous tree species
Tiphan	:	Agricultural instrument
Taluka/Tahsil	:	A Revenue Administrative Block.

**LOCAL AND BOTANICAL NAMES OF PLANTS OCCURRING IN
CENTRAL CHANDA FOREST DIVISION.**

A. TREES		
Local Name	Botanical Name	Family
Achar(H),Char(M)	Buchanania lanzan	Anacardiaceae
Ain(M),Saja(H)	Terminalia alata	Combretaceae
Ali/Aal/Bartondi	Morinda tinctoria	Rubiaceae
Amaltas/Bahawa	Cassia fistula	Caesalpiniaceae
Amta	Bauhinia malabarica	Caesalpiniaceae
Akashneem	Millingtonia hortensis	Rignonaceae
Aam	Mangifera indica	Anacardiaceae
Apta/Kachnar	Bauhinia racemosa	Caesalpiniaceae
Aonla	Emblica officinalis	Euphorbiaceae
Arjuna/Kahu	Terminalia arjuna	Combretaceae
Asah/Lendia/Schena	Lagerstroemia parviflora	Lythraceae
Babul/Babool	Acacia nilotica	Mimosaceae
Bakain/Bakaneem	Melia azadirach	Meliaceae
Beheda	Terminalia bellerica	Combretaceae
Bel	Aegle marmelos	Rutaceae
Bhirra	Chloroxylon swietenia	Rutaceae
Biba/Bhilawa	Semecarpus anacardium	Anacardiaceae
Bija	Pterocarpus marsupium	Fabaceae
Bistendu	Diospyros montana	Ebenaceae
Bor/Ber	Zizyphus mauritiana	Rhamnaceae
Chandan	Santalum album	Santalaceae
Chichwa	Albizia odoratissima	Mimosaceae
Chinch	Tamarindus indica	Caesalpiniaceae
Dahibaras	Cordia macleodii	Boraginaceae
Dhaman	Grewia tilifolia	Tiliaceae
Dhawada/Dahwada	Anogeissus latifolia	Caesalpiniaceae
Dhoban/Phansi	Dalbergia paniculata	Fabaceae
Ghoti/Ghot	Zizyphus glaberrima	Rhamnaceae
Ganohi	Abrus precatorius	--
Garari	Cleistanthus collinus	Euphorbiaceae
Gongal	Cochlospermum religiosum	Cochlospermaceae
Haldu	Adina cordifolia	Rubiaceae
Hiwar	Acacia leucophloea	Mimosaceae
Hirda/Harra	Terminalia chebula	Combretaceae
Jambhul/Jamun	Syzygium cumunii	Myrtaceae
Kalam.Mundi	Mitragyna parviflora	Rubiaceae
Kakai	Flacourtia indica	Flacourtiaceae
Kala siras	Albizia lebbek	Mimosaceae
Karai	Millusa velutina	Anonaceae

Karanj	Pongamia pinnata	Fabaceae
Karu(Cassia)	Cassia siamea	Caesalpiniaceae
Khair	Acacia catechu	Mimoseae
Kusum	Scheleichera oleosa	Sapindaceae
Kawat	Limonia acidissima	Rutaceae
Kulu	Sterculia urens	Sterculiaceae
Khirni	Manilkara haxandra	Sapotaceae
Kumbhi	Careya arborea	Lecythidiceae
Kusug	Schleichera oleosa	Sapotaceae
Lendia/Lenda/schena/Asah	Lagerstroemia parviflora	Lythraceae
Lokhandi	Ixora arborea	Rubiaceae
Medsing	Dolichandrone falcata	Bignoniaceae
Moha/Mahuwa	Madhuca longifolia	Sapotaceae
Maharukh	Ailanthus excelsa	Simarubaceae
Mokha	Schrebera swietenoides	Aristolochiaceae
Moyen/Mowai	Lannea coromandelica	Anacardiaceae
Neem	Azadirachta indica	Meliaceae
Parad	Stereospermum Squaveolens	Bignoniaceae
Paradi	Stereospermum chelenoides	Bignoniaceae
Pipal	Ficus religiosa	Moraceae
Papada	Garenia latifolia	Rubiaceae
Rohan	Soymida febrifuga	Meliaceae
Sag/Sagwan/Teak	Tectona grandis	Verbenaceae
Saja/Ain	Terminalia alata	Combretaceae
Salai	Boswellia serrata	Burseraceae
Semal(Borgu)	Bombax ceiba	Bombaceae
Shiwan/Siwan	Gmelina arborea	Verbenaceae
Sirus(Black)	Albizzia lebbek	Mimoseae
Sirus(White)	Albizzia procera	Mimoseae
Sissoo	Dalbergia sissoo	Fabaceae
Sitaphal	Annona squamosa	Annonaceae
Sinduri	Mallotus philippensis	-
Surya	Xylia xylocarpa	Mimosaceae
Tendu	Diospyros melanoxylon	Ebenaceae
Tiwas/Tinsa	Ougenia oojeinensis	Fabaceae
Umber	Ficus racemosa	Moraaceae

B. SHRUBS AND HERBS

Local Name	Botanical Name	Family
Banrahar	Flemingia Semialata	Fabaceae
Bharati	Gymnosporia spinosa	Celastraceae
Chipti	Desmodium pulchellum	Fabaceae
Chillari	Mimosa rubicaulis	Mimoseae
Chillati	Caesalpinia sepiaria	Caesalpiniaceae
Dudhi/Kalakuda	Wrightia tinctoria	Apocyanaceae
Dhavati	Woodfordia floribunda	Lythraceae
Dikamali	Gardenia resinifera	Bubiaceae
Ghaneri	Lantana camera	Verbenaceae
Kudursi	Bridelia hamiltoniana	Euphorbiaceae
Kudmudi	Gardenia gummifera	Rubiaceae
Kharoti	Grewia Hirsuta	Tiliaceae
Kharata	Dodonaea viscosa	Sapindaceae
Kari Korando	Carrissa spinarium	Apocyanaceae
Korat	Barleria prionitis	Acanthaceae
Kuda, Indrajav	Holarrihena antidysenterica	Apocyanaceae
Muradsheng/Marorphal	Helicteres isora	Sterculiaceae
Nirmali	Strychnos potatorum	Strychnaceae
Neel	Indigofera cassioides	Papilionaceae
Nirgudi	Vitex negundo	Verbenaceae
Parijatak	Mucunahes arbitristis	Nyctanthaceae
Phetra-safed	Gardenia latifolia	Bubiaceae
Phetra-kala	Tamilnadia uliginosa	Bubiaceae
Sindhi/Chhindi	Phoenix sylvestris	Arecaceae(Palmaceae)
Tarwar	Cassia auriculata	Caesalpiniaceae
Tarota	Cassia tora	Caesalpiniaceae
Waghoti	Capparis horrida	Capparidaceae
Zingrool/Pharsa	Grewia orbiculata	Tiliaceae

C. HERBS

Local Name	Botanical Name	Family
Divali	Tephrosia hamiltonii	Fabaceae
Gajargawat	Parthenium hysterophorus	Astraceae
Gokru	Tribulus terrestris	Zygophyllaceae
Hamata	Stylosanthes hamata	Caesalpiniaceae
Pivla Dhotra	Argemone mexicana	Papaveraceae
Pivili tilwan	Cleome viscosa	Cleomaceae
Rantulsi/Bantulsi	Hyptis suaveolens	Lamiaceae
Rantur	Atylosia scarabaeoides	Fabaceae
Scabra	Stylosanthes scabra	Caesalpiniaceae
Tarota	Cassia tora	Caesalpiniaceae

D. GRASSES AND BAMBOOS

Local Name	Botanical Name	Family
Bans/Bamboo	Dendrocalamus strictus	Poaceae
Bhurbhusi	Eragrostis tenella	Poaceae
Duswa/Haryalli/Doob	Cynodon dactylon	Poaceae
Dongri gavat	Chrysopogon montana	Poaceae
Guhar, marwel	Andropogon annulatus	Poaceae
Kans	Saccharum spontaneum	Poaceae
Khas	Vetiveria zizanioides	Poaceae
Kodmor	Apluda varia	Poaceae
Kunda	Ischoemum pilosum	Poaceae
Kusal	Heteropogon contortus	Poaceae
Mushan	Iseilema laxum	Poaceae
Paonia	Sehima sulcatum	Poaceae
Sabai or sum	Ischaemum angustifolium	Poaceae
Sheda	Sehima nervosum	Poaceae
Tikhadi/Rusa/Rosha	Cymbopogon martini	Poaceae

E. CLIMBERS

Local Name	Botanical Name	Family
Bhuikand/Baichend	Dioscorea daemona	Dioscoriaceae
Chilati	Acacia pinnata	Mimoseae
Eruni	Zizyphus oenoplia	Rhamnaceae
Gunchi/Gunj	Abrus precatorius	Papilionaceae
Khajkuri	Mucuna pruriens	Fabaceae
Kukuranji	Calycopteris floribunda	Combretaceae
Lalbel/Papri	Vontilago denticulata	Rhamnaceae
Mahulbel/Mahul	Bauhinia vahlli	Caesalpiniaceae
Palasvel	Butea superba	Fabaceae
Piwarvel	Combretum ovalifolium	Combretaceae
Ramdaton	Smilax zeylanica	Liliaceae
Shatova/Satawari	Asparagus racemosus	Liliaceae
Shembi	Acacia pinnata	Caesalpiniaceae
Kawavel,Dudhi(Nagbel)	Cryptolepis buchanani	Asclepiadaceae

F. PARASITE

Local Name	Botanical Name	Family
Panda	Dendrophthoe falcata	

G. EPIPHYTES

Local Name	Botanical Name	Family
Vanda	Vanda cesellata	Orchidaceae

**LOCAL AND BOTANICAL NAMES OF MEDICINAL PLANTS OCCURRING IN
CENTRAL CHANDA FOREST DIVISION.**

Local Name	Botanical Name	Family
Pivili tilwan	<i>Cleome viscosa</i>	Cleomaceae
Rantulsi/Bantulsi	<i>Hyptis suaveolens</i>	Lamiaceae
Rantur	<i>Atylosia scarabaeoides</i>	Fabaceae
Scabra	<i>Stylosanthes scabra</i>	Caesalpinaceae
Shatova/Satawari	<i>Asparagus racemosus</i>	Liliaceae
Kawavel,Dudhi(Nagbel)	<i>Cryptolepis buehneri</i>	Asclepiadaceae
Bhuikand/Baichend	<i>Dioscorea daemona</i>	Dioscoriaceae
Khajkuri	<i>Mucuna pruriens</i>	Fabaceae
Khas	<i>Vetiveria zizanioides</i>	Poaceae
Tikhadi/Rusa/Rosha	<i>Cymbopogon martini</i>	Poaceae
Achar(H),Char(M)	<i>Buchanania lanzan</i>	Anacardiaceae
Amaltas/Bahawa	<i>Cassia fistula</i>	Caesalpinaceae
Amta	<i>Bauhinia malabarica</i>	Caesalpinaceae
Akashneem	<i>Millingtonia hortensis</i>	Rignonaceae
Aam	<i>Mangifera indica</i>	Anacardiaceae
Aonla	<i>Emblica officinalis</i>	Euphorbiaceae
Babul/Babool	<i>Acacia nilotica</i>	Mimosaceae
Bakain/Bakaneem	<i>Melia azadirach</i>	Meliaceae
Beheda	<i>Terminalia bellerica</i>	Combretaceae
Bel	<i>Aegle marmelos</i>	Rutaceae
Biba/Bhilawa	<i>Semecarpus anacardium</i>	Anacardiaceae
Bija	<i>Pterocarpus marsupium</i>	Fabaceae
Bistendu	<i>Diospyros montana</i>	Ebenaceae
Bor/Ber	<i>Zizyphus mauritiana</i>	Rhamnaceae
Chandan	<i>Santalum album</i>	Santalaceae
Chinch	<i>Tamarindus indica</i>	Caesalpinaceae
Garari	<i>Cleistanthus collinus</i>	Euphorbiaceae
Gongal	<i>Cochlospermum religiosum</i>	Cochlospermaceae
Hirda/Harra	<i>Terminalia chebula</i>	Combretaceae
Jambhul/Jamun	<i>Syzygium cumunii</i>	Myrtaceae
Kusum	<i>Scheleicheria oleosa</i>	Sapindaceae
Kawat	<i>Limonia acidissima</i>	Rutaceae
Kulu	<i>Sterculia urens</i>	Sterculiaceae
Khirmi	<i>Manilkara hexandra</i>	Sapotaceae
Kumbhi	<i>Careya arborea</i>	Lecythidaceae
Medsing	<i>Dolichandrone falcata</i>	Bignoniaceae
Moha/Mahuwa	<i>Madhuca longifolia</i>	Sapotaceae
Maharukh	<i>Ailanthus excelsa</i>	Simarubaceae
Neem	<i>Azadirachta indica</i>	Meliaceae
Paradi	<i>Stereospermum chelonoides</i>	Bignoniaceae

Pipal	Ficus religiosa	Moraceae
Saja/Ain	Terminalia alata	Combretaceae
Salai	Boswellia serrata	Burseraceae
Sitaphal	Annona squamosa	Annonaceae
Sinduri	Mallotus philippensis	-
Tendu	Diospyros melanoxylon	Ebenaceae
Umber	Ficus racemosa	Moraaceae
Dhatura	Adhatoda vasica	

**COMMON AND ZOOLOGICAL NAMES OF THE ANIMALS AND BIRDS
COMMONLY FOUND IN CENTRAL CHANDA DIVISION .**

A. LIST OF ANIMALS

Common Name	Scientific Name
Tiger /Wagh(M)/ Sher(H)	<i>Panthera tigris</i>
Panther/Bibta(M)/Tendua(H)	<i>Panthera pardus</i>
Wild Dog /Dhole (M)/Jungli Kutta(H)	<i>Cuon alpinus</i>
Indian Bison /Gawa(M)/Gaur(H)	<i>Bos gaurus</i>
Striped Hyena /Tadas(M)/Lakkadbagha(H)	<i>Hyaena hyaena</i>
Jackal/Kolha(M)/Siyar(H)	<i>Canis aureus</i>
Wolf/Landga(M)/Bhedia(H)	<i>Canis lupus</i>
Red Fox	<i>Vulpes vulpes</i>
Indian Fox	<i>Vulpes bengalensis</i>
Jungle cat	<i>Felis chaus</i>
Black buck	<i>Antelope cervicapra</i>
Sambhar	<i>Cervus unicolor</i>
Cheetal	<i>Axis axis</i>
Barking deer	<i>Muntiacus muntjak</i>
Chausigha	<i>Tetracorus quadricornis</i>
Chinkara	<i>Gazella gazella</i>
Hog deer	<i>Axis porcinus</i>
Nilgai	<i>Boselaphus tragocamelus</i>
Wild boar	<i>Sus scrofa</i>
Sloth bear/ Aswal(M)/ Bhalu(H)	<i>Melursus ursinus</i>
Common langur	<i>Presbytis entellus</i>
Porcupine	<i>Hystrix indica</i>
Hare	<i>Lepus nigricollis</i>
Mouse Hare	<i>Ochotona roylei</i>
Civets	<i>Viverra zibethica</i>
Indian Pangolin/Khawala manjar	<i>Manis crassicaudata</i>
Bush Rat	<i>Gollunda ellioti</i>
Field Mouse	<i>Mus booduga</i>
Mongoose(M)/ Newala(H)	<i>Herpestes edwardsi</i>
Spiny Field Mouse	<i>Mus platythrix</i>
Mouse deer	<i>Tragulus meminna</i>
Common Giant Flying Squirrel	<i>Petaurista petaurista</i>
Indian Giant Squirrel	<i>Ratufa indica</i>

B. LIST OF BIRDS

Common Name	Scientific Name
Pond Heron or Paddy bird	<i>Ardeola grayii</i>
Cattle Egret	<i>Bubulcus ibis</i>
White Breasted Waterhen	<i>Amaurornis phoenicurus</i>
Grey Partridge	<i>Francolinus pondicerianus</i>
Jungle Bush Quail	<i>Perdica asiatica</i>
Yellow Wattled Lapwing	<i>Vanellus malabaricus</i>
Rose Ringed Parakeet	<i>Psittacula krameri</i>
Blosson Headed Parakeet	<i>Psittacula cyanocephala</i>
Alexandrine Parakeet	<i>Psittacula eupatria</i>
Koel	<i>Eudynamis scolopacea</i>
Crow Pheasant (Coucal)	<i>Centropus sinensis</i>
Spotted owl	<i>Athene brama</i>
Common Indian Night Jar	<i>Caprimulgus asiaticus</i>
White Breasted Kingfisher	<i>Halcyon smyrenesis</i>
Common Kingfisher	<i>Alcedo atthis</i>
Green Bee Eater	<i>Merops orientalis</i>
Hoopoe	<i>Upupa epops</i>
Indian Roller	<i>Coracias bengalensis</i>
Golden Backed Wood Pecker	<i>Dinopium benghalense</i>
Rufous Backed Shrike	<i>Lanius schack</i>
Golden Oriole	<i>Oriolus riolus</i>
Black Drongo	<i>Dicrurus adsimilis</i>
Brahminy Myna	<i>Sturnus pagodarum</i>
Common Myna	<i>Acridotheres tristis</i>
House Crow	<i>Corvus splendens</i>
Jungle Crow	<i>Corvus macrorhynchos</i>
Small Minivet	<i>Pericrocotus cinnamomeus</i>
Common lora	<i>Aegithina tiphia</i>
Red Vented Bulbul	<i>Pycnonotus cafer</i>
Common Babbler	<i>Turdoides caudatus</i>
White throated Fantail Flycatcher	<i>Rhipidura albicollis</i>
Paradise Flycatcher	<i>Terpsiphone paradisi</i>
Magpie Robin	<i>Copsychus saularis</i>
Indian Robin	<i>Saxicoloides fulicata</i>
Gray Wagtail	<i>Motacilla cinerea</i>
Pied or White Wagtail	<i>Motacilla alba</i>
Grey Tit	<i>Parus major</i>
Purple Sunbird	<i>Nectarinia asiatica</i>
House Sparrow	<i>Passer domesticus</i>

Red Jungle Fowl
 Common Peafowl
 Scavenger Vulture
 Indian Long Billed Vulture
 Dusky Horned Owl
 Brown Hawkowl
 Brown Wood Owl
 Common Grey Hornbill
 Great Indian Bustard
 Rock Bees
 Smaller Forest Bees

Gallus gallus
 Pavo cristatus
 Neophron perenopterus
 Gyps indicus
 Bubo coromandus
 Ninox scutulata
 Strix leptogrammica
 Tockus birostris
 Choriotis nigriceps
 Apis dorsata
 Apis indica

C. ENDANGERED WILDLIFE

Common Name	Scientific Name
Tiger	Panthera tigris
Panther	Panthera pardus
Sloth bear	Melursus ursinus
Peacock	Pavo cristatus
Bison	Bos gaurus
Civet cat	Viverra megaspilla

CHAPTER - I

THE TRACT DEALT WITH

SECTION 1.1 : NAME AND SITUATION :

1.1.1.1. This working plan is the first consolidated working plan for all the forest areas incharge of the Forest Department in Ballarsha, Dhaba, Kothari, Rajura, Wansadi and Wirur Forest Ranges of Central Chanda Forest Division in South Chandrapur Circle in Chandrapur District of Maharashtra.

1.1.1.2. This working plan replaces the working plan of Shri K.N. Khisti for the areas of Ballarshah, Dhaba and Kothari ranges for the period from 1979-80 to 1993-94 and working plan of Shri R.N. Biswas IFS, Shri V B Pandit, Shri S S Mahajan and Dr. Nand Kishor IFS for the areas of Rajura, Wansadi and Wirur ranges for the period 1993-94 to 2002-03. This is the first consolidated working plan for the present Central Chanda Forest Division covering the entire forests i.e. Reserved Forests, Proposed Reserved Forests, Protected Forests and Unclassed Forests (Zudupi Jungle under taken by division and the non forest areas under taken by the division for compensatory afforestation). The forest area included in this working plan is **1,14,309.4** ha, out of which **88,862.742** ha is **Reserved Forests**, **19,647.197** ha **Protected Forests** and **5,799.46** hectare **Unclassed Forests**.

1.1.1.3. The forest areas of Ballarsha, Kothari, Dhaba, Rajura, Wansadi and Wirur Ranges are situated within the civil territories of Ballarshah, Chandrapur(part), Rajura, Korpana, Jioti, Pombhurna, Mul(part) and Gondpipri Tahsils of Chandrapur District. These areas lie between latitudes **19° 31' to 20° North** and longitudes **78° 50' 30" to 79° 45' East**.

1.1.1.4. The boundaries of the tract dealt with are as follows :

↑ **NORTH** : Painganga and Wardha rivers along the Yavatmal District, Chanda and Mul Forest Ranges of Chandrapur Forest Division.

⇒ **EAST** : Wainganga river along Gadchiroli district and Andhra Pradesh.

↓ **SOUTH** : Wardha river and Andhra Pradesh.

⇐ **WEST** : Andhra Pradesh, Pandharkawada and Chandrapur Forest Divisions of Maharashtra State.

SECTION:1.2 : CONFIGURATION OF THE GROUND :

1.2.1.1. The terrain in Ballarshah, Kothari and Dhaba Ranges is mostly flat to gently undulating. Small patches to the North-East and North-West of Dhaba and Kothari Ranges are slightly hilly. The altitude varies from 180 metre to 294 metre above mean sea level. The hill blocks have Western and Southern aspects and streams drain into the Wardha river. Streams in the North-East drain into Andhari Nala, a tributary of the Wainganga.

1.2.1.2. Nearly 25% of forest areas of Rajura, Wansadi and Wirur ranges are situated in the plain with slight undulations. This consists of Rajura, Somthana, Moorti, Chicholi, northern and eastern portions of Garlapeth, Mangalhira, Chanai-Barsa I, and Chanai-Barsa II, Pardi, Kanergaon, Ahson and other isolated Blocks. Manickgarh is very hilly and rugged country with one main ridge, which branches and re-branches in all directions forming several plateaus of varying extents at places. Southern portion of Garlapeth block and south-west half of Siddheshwar block are also very hilly with steep slopes. The lowest altitude of the plains forests is 169.2 meter above the mean sea level, while the highest point is attained by the main ridge of Manickgarh hills at **Jettamedia** with an altitude of 588.6 m eter above the mean sea level.

DRAINAGE :

1.2.2.1. The tract is interspersed with big and small nalas draining into the Wardha and Wainganga rivers. The important nalas which flow or contain water throughout the year are Upasa and Pilkhana nalas in Dhaba Range; Bhagrati, Bhivkund, Pandharpani, Jharan and

Hatti nalas in Ballarshah Range and Dhaba, Jamri, Lahan Jharan etc nalas in Kothari Range. Apart from nalas mentioned above, there are a number of seasonal nalas within the tract flowing during monsoon and till the end of February.

1.2.2.2. The whole of the forests tract of Rajura, Wansadi and Wirur ranges, excepting the southern slopes of Manickgarh block, forms the catchment of Wardha river which ultimately drains into Wainganga forming Pranhita river which is a major tributary to Godavari river. Northern slopes of Manickgarh hills drain into Painganga river through Mehindi, Jevra, Deoghat, Varu, and Bop nalas and also into Wardha river through Sasti nala. Painganga river joins to Wardha river in the north at Jugad. Forests of Rajura, Chicholi, Somthana, Moorti, Siddheshwar and Garlpeth blocks drain into Wardha river through Rajura, Dongar and Annur nalas. Southern slopes of Manickgarh hills drain into Pedda vagu through Chikali vagu, Bapar Vagu and Persikuder nalas; the Pedda vagu ultimately draining into river Godavari through Pranhita river.

SECTION 1.3 : GEOLOGY, ROCKS AND SOILS :

1.3.1.1. GEOLOGY & ROCKS:- The geological formations of the tract are as follows:

Recent to Sub-Recent – Alluvium/Laterite.

Eocene to Cretaceous – Deccan trap (Basalt), (Feruginous gravelly soils) with Inter-Trappeans.

Permo-Carboniferous – Sandstone/Shale, Kamathi and Barakar Formation (Lower Gondwana) Sandy soils/Sandstone/Shale/Talchir Formation. (Lower Gondwana) Black cotton soils.

Pre-Cambrian – Shale/Sandstone/Limestone. (Vindhyan System) Loamy soils.

Recent to Sub-Recent:- Deposits of laterite of Recent to Sub-Recent age occurs in the vicinity of Manickgarh fort towards South and South West.

Eocene to Cretaceous :- Almost the whole Southern part of the area is covered by Deccan Trap. It consists of layers of basaltic lavas, varying from amygdaloidal basalt to massive basalt. At places, the amygdules are filled with various minerals like quartz, amethyst, calcite, agate chaledony and jasper. The rocks are generally dark grey and greenish grey in colour. The non vesicular types are hard, tough, compact and medium to fine grained, breaking with conchoidal fracture. The vesicular types are comparatively soft and break more easily.

Permo-Carboniferous:- The formations belonging to this division include Sandstones and shales of Lower Gondwana Systems and consists of Kamathi, Barakar and Talchir Formations. A small portion in north, between the villages Sangoda-Bergaon and Awarpur-Bakardi and also a considerable area towards NorthEast and East, which include areas surrounding Sasti, Manickgarh, Rajura Wirur and Chicholi belongs to Kamathi and Barakar Group of formations.

Pre-Cambrian:- Almost three fourth of the tract which lies on the north belongs to this division. It is known as Vindhyan System and mainly contains shale, sandstone and limestone.

1.3.2.1.SOILS:- The soils of the tract dealt with come under the Lower Maharashtra (Deccan) Plateau (Metamorphic) Soil type of Maharashtra under which western side is dominated with alluvial plain and the eastern portion has uneven hill ranges. The soils are developed from granite, gneisses, schists and alluvium.

1.3.2.2. Soils of summits and spurs:- Gently sloping summits and spurs consists of shallow, well drained, neutral to alkaline (pH 6.5 - 8.5), fine loamy to loamy, calcareous, Typic Ustorthents and Lithic Ustorthents with severe erosion and low water holding capacity.

1.3.2.3. Soils of Undulating lands:- Gently sloping undulating lands consist of shallow to moderately deep, well drained, neutral (pH 6.5 – 7.5), loamy, fine loamy and fine. Lithic and Typic ustorthents and Typic Ustropepts with low water and nutrient holding capacities and moderate to severe erosion.

1.3.2.4. Very gently sloping undulating lands consist of deep to very deep, moderately well drained, neutral (pH 6.5-7.5) clayey Vertic Ustopepts and Typic Chromustants with moderate erosion, high water and nutrient holding capacity.

1.3.2.5. Soils of hills and ridges with pediments:- Moderately sloping hills and ridges consist of shallow, well drained neutral (pH 6.5-7.5) loamy- skeletal, Lithic Ustorthents, Typic Ustorthents and Typic Ustorthents with severe erosion and moderate stoniness.

1.3.2.6. Gently sloping pediments surfaces consist of slightly deep, well drained loam Typic Ustopepts and Typic Ustorthents with severe erosion. At places deep, well drained, slightly acidic (pH 5.5-6.5), fine loamy, Typic Haplustolls and Typic Ustopepts with moderate erosion are observed.

1.3.2.7 Very gently sloping pediments surfaces consist of very deep, well drained, calcareous, neutral to alkaline (pH 6.5-8.5), clayey Typic chromusterts and Typic Ustopepts and Vertic Ustopepts with high water holding and high Chemical Exchange Capacity.

1.3.2.8 Soil of alluvial plains:- Very gently sloping plains of alluvial origin consist of very deep, moderately well drained, neutral (pH 6.5-7.5), cracking, clayey, Typic Chromusterts, Vertic Ustopepts and Typic Ustopepts. These soils have high shrink swell potential, high water holding capacity, high exchangeable bases.

1.3.2.9. Soils of valleys:- The gently sloping valleys consist of very deep, moderately well drained, fine loamy, calcareous, neutral to alkaline (pH 6.5-8.5), Fluventic Ustochrepts and Vertic Ustochrepts with moderate erosion.

1.3.2.10. Soil Constraints:-

- Coarse textured soil with low water and nutrient holding capacity.
- Ridges and hill areas are prone to erosion.
- Indiscriminate felling of trees and improper agricultural practices by the resident tribals cause deterioration in the ecosystem.

1.3.2.11. Potential :- Area has assured rainfall of more than 1200 mm and rich in coal, limestone, dolomite, manganese etc ores.

- The soils are deep and have high water holding capacity (WHC) and high fertility in plains.

1.3.2.12. Strategies:- Afforestation of the hilly areas to restrict degradation through erosion and to develop the species of timber.

1.3.3. The range wise distribution of rocks and the soils derived therefrom are as follows :

1.3.3.1. BALLARSHAH RANGE : The forests in this range are growing over Kamthi sandstones. The tract from Ballarshah to Junona and extended upto Warora is almost entirely coal bearing and has high potential of coal reserves. The soil is sandy loam, moderately deep and supports medium quality mixed forests.

1.3.3.2. KOTHARI RANGE : In this range, area North-East of village Kanhargaoon and North of village Aksapur is comprised of sedimentary rocks of purana group. This group is represented by quartzites and limestones of conglomerates formation. Soil derived from these is clayey loam and supports medium quality (IV a to III) forests. Rest of the areas of Kothari Range is comprised of the Kamthi series of rocks belonging to the Lower Gondwana system. Kamthi series is represented by the feruginous sandstones and clays, both white and yellow. Soil derived is fairly deep, fertile sandy loam and supports high quality mixed forests. However, the soil being sandy loam, soft and friable is easily susceptible to erosion wherever the area is subjected to undue opening and undesirable impact due to biotic factors, such as heavy grazing, illicit felling and annual fires. The patches, where the top layer of the soil has been eroded due to sheet or gully erosion, have become comparatively less fertile and supporting only low quality (IV) forests. Such patches are not uncommon in this tract.

1.3.3.3. DHABA RANGE : The tract to the West of Dhaba is covered by Kamthi series of rocks represented by sandstones and clays. The remaining forest areas to the North-East of

Dhaba is occupied by the igneous rocks, such as gabbro and pyroxenite and gneisses of Pre-Cambrian age. The soil to the West of Dhaba is sandy loam deep and fertile supporting high quality mixed forests and to the North-East of Dhaba is clayey soil which is grayish in colour and supports medium quality teak forest (IV -III). Narrow band of limestone formation belonging to Vindhyan series exists which lies between Dongargaon in the South-East to Karanji in the centre. Soil is clayey loam with moderate depth and fertility and supports forests of quality- III to II.

1.3.3.4. RAJURA RANGE: Most of the areas of this range comprise Pre-Cambrian formation of Vindhyan system and contains shale, sandstone and limestone. Also some Permian-Carboniferous formation is found consisting of sandstone and shales of Lower Gondwana and Kamthi and Barakar groups of formation.

1.3.3.5. WANSADI RANGE: Most of the areas of this range comprise Pre-Cambrian formation of Vindhyan system and contains shale, sandstone and limestone. Also some Permian-Carboniferous formation is found consisting of sandstone and shales of Lower Gondwana and Kamthi and Barakar groups of formation. Southern portion of this range areas are of Eocene to Cretaceous age forming the Deccan trap. It consists of layers of basaltic lavas, varying from amygdaloidal basalt to massive basalt. At places, the amygdules are filled with various minerals like quartz, amethyst, calcite, agate chalcedony and jasper. The rocks are generally dark grey and greenish grey in colour. The non vesicular types are hard, tough, compact and medium to fine grained, breaking with conchoidal fracture. The vesicular types are comparatively soft and break more easily.

1.3.3.6. WIRUR RANGE: Areas of this range are of Eocene to Cretaceous age forming the Deccan trap. It consists of layers of basaltic lavas, varying from amygdaloidal basalt to massive basalt. At places, the amygdules are filled with various minerals like quartz, amethyst, calcite, agate chalcedony and jasper. The rocks are generally dark grey and greenish grey in colour. The non vesicular types are hard, tough, compact and medium to fine grained, breaking with conchoidal fracture. The vesicular types are comparatively soft and break more easily. Some areas are of recent to subrecent age and Permian-Carboniferous age. Soils are found as mixture of sandy soil, skeletal soil, stony red soil and black cotton soils inter mixed with each other at places.

SECTION 1.1.4 : CLIMATE :

1.4.1.1. The climate is characterised by a hot summer, well distributed rainfall during the south-west monsoon season and general dryness except in the rainy season. Three distinct seasons are recognised, which are as follows :

1.4.1.2. HOT SEASON (SUMMER) : Summer is mostly hot and dry. It starts from the end of February and continues upto mid of June i.e. onset of monsoon. April and May experience unbearable heat.

1.4.1.3. MONSOON SEASON (RAINS) : Normally, monsoon breaks in by mid of June and continues upto October. Average annual rainfall in this tract is 1377 mm.

1.4.1.4. COLD (WINTER) : It starts from November and continues upto the end of February. Winter is fairly cool, pleasant and healthy. Occasional showers are received. Frost does not occur.

1.4.2. RAINFALL :

1.4.2.1. Records of rainfall for Rajura Station of Central Chanda Forest Division are available from 1975 onward. The annual rainfall varies from 900 mm. to 1600 mm. The rainfall data for four season periods i.e. from 1951 to 1965 (Data from S.B. Kulkarni's plan), from 1975 to 1985 and from 1986 to 1991, 1999 have been taken for comparison. The following table gives the comparative average rainfall for the respective periods.

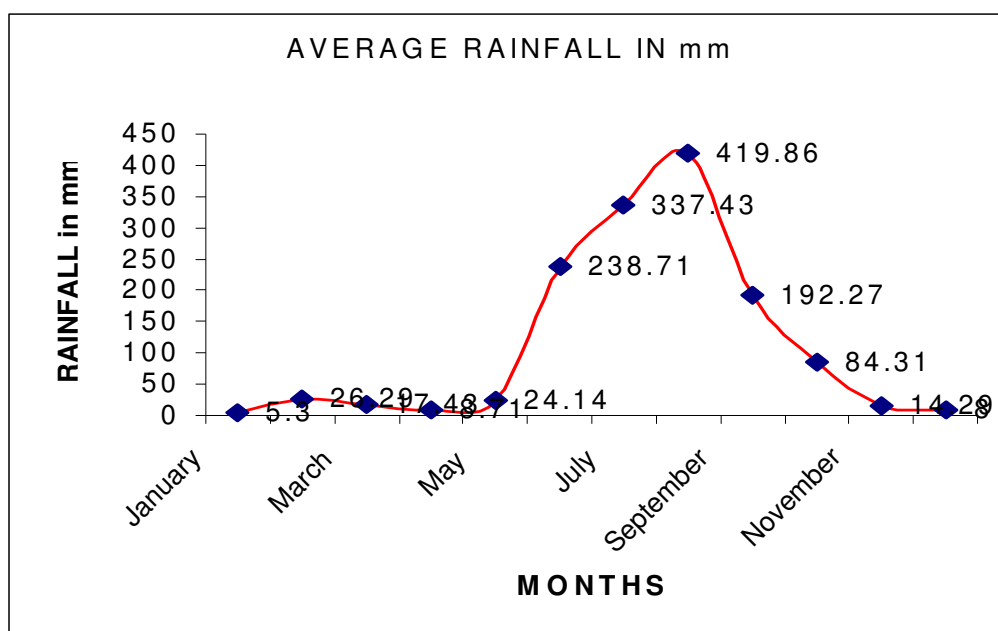
Month	Average rainfall at Rajura Station in mm.			
	1951-1965	1966-1985	1986-1991	1999
January	1.40	11.02	6.17	NA
February	10.70	2.90	30.67	NA
March	16.30	1.36	20.33	NA
April	18.50	4.64	10.17	NA

May	11.10	0.82	28.17	NA
June	164.00	189.63	232.00	184.2
July	292.60	346.23	371.67	382.9
August	368.00	187.56	439.67	333.2
September	269.60	310.50	190.00	228.2
October	65.70	62.22	78.50	50.4
November	6.50	5.90	16.67	NA
December	2.40	9.82	9.33	NA
Total for year	1226.80	1132.65	1433.33	

1.4.2.2. Premonsoon showers occur in the month of May and the main rainy season starts from June and continues upto October. Rainfall Averages for this tract indicate that 86 % of the annual rainfall is received during June to October and 14 % during pre and post monsoon months. It is also noticeable from above table that average rainfall decreased during 1975-1985 period and increase during 1986-1991 period and again decreased in 1999.

ANNUAL RAINFALL AT RAJURA (in milimeter)

Month/Year	1986	1987	1988	1989	1990	1991	1999	Average
January	12	20	0	0	0	5	0.00	
February	92	0	60	0	32	0	0.00	
March	11	22	32	16	41	0	0.00	
April	38	0	20	0	0	3	0.00	
May	4	0	0	0	160	5	0.00	
June	164	87	270	273	436	162	279.0	
July	464	133	605	191	448	389	132.0	
August	858	252	265	251	741	271	301.0	
September	450	97	237	182	97	77	205.9	
October	28	103	186	3	151	0	119.2	
November	0	64	13	0	0	23	0.00	
December	51	0	0	5	0	0	0.00	
Total	2172	778	1688	921	2106	935	1037.1	



1.4.2.3. It is obvious that rainfall is not steady for all the years. Variation of rainfall is too much. It was 2172 mm in 1986. While in 1987 it was only 778mm. The variation of rain and temperature adversely affects the regeneration of forests naturally or artificially.

1.4.3.TEMPERATURE:

1.4.3.1. Temperature data for a station locating in the geographical area of this division is not available. But this tract has the same climatic condition as that of Chandrapur; the abstract of average temperature data for Chandrapur station is produced here.

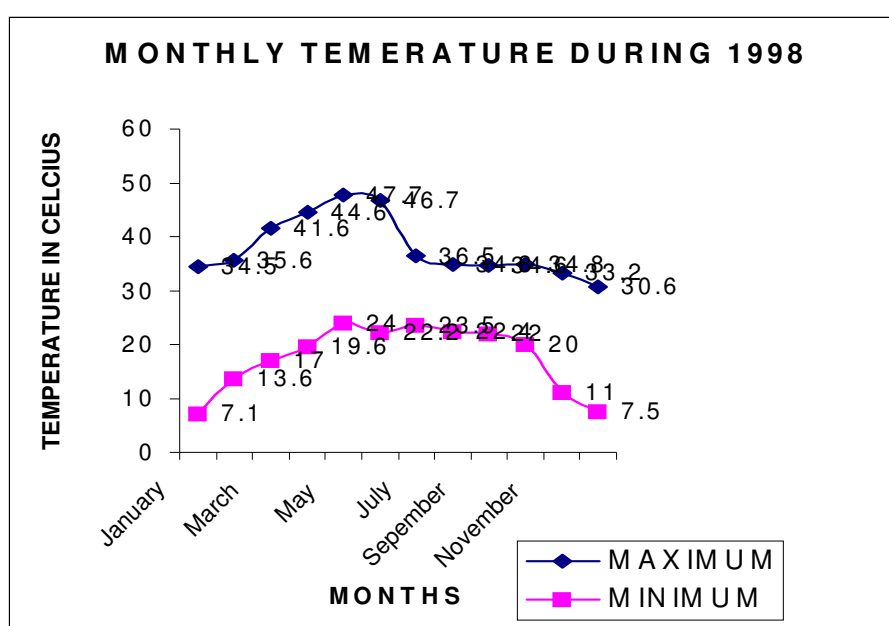
TEMPERATURE AND RELATIVE HUMIDITY

Month	Mean daily Max.	Mean daily Min.	Highest max. Ever.		Lowest min. ever.		Relative Humidity % at hours.	
			°C	Date	°C	Date	0830	1730
Jan	29.0	9.5	35.6	29/1/1900	2.8	10/1/1899	69	41
Feb	33.0	11.8	39.6	29/2/1951	3.9	2/2/1905	60	33
Mar	37.2	16.8	44.4	27/3/1892	7.2	5/3/1898	43	23
Apr	40.9	21.6	46.1	30/4/1942	11.7	1/4/1905	39	22
May	42.5	22.2	48.8	16/5/1912	18.9	9/5/1919	35	21
Jun	37.4	22.4	47.2	10/6/1931	20.0	18/6/1919	61	51
Jul	31.9	21.4	40.6	4/7/1997	17.8	31/7/1954	79	75
Aug	30.7	22.1	37.2	3/8/1954	18.3	26/8/1954	81	74
Sep	32.2	20.9	37.2	22/9/1899	18.3	28/9/1904	81	72
Oct	32.5	15.8	37.8	9/10/1899	11.7	27/10/1882	73	60
Nov	30.7	11.7	36.1	9/11/1960	7.2	27/11/1950	71	52
Dec	29.1	8.3	33.1	22/12/1933	3.9	19/12/1883	74	46
Annual average	33.9	17.0						

Temperature during summer shoots up fairly high. The average maximum temperature reaches upto 46⁰ c. The maximum and minimum temperature recorded is 48.8⁰ Celsius and 2.8⁰ Celsius respectively.

SN	MONTH	YEAR	MAXIMUM	MINIMUM
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1	January	1998	34.5	7.1
2	February	1998	35.6	13.6
3	March	1998	41.6	17.0
4	April	1998	44.6	19.6
5	May	1998	47.7	24.0
6	June	1998	46.7	22.2
7	July	1998	36.5	23.5
8	August	1998	34.8	22.4
9	September	1998	34.6	22.0
10	October	1998	34.8	20.0
11	November	1998	33.2	11.0
12	December	1998	30.6	7.5
YEAR' 1998(In degree Celcius)			47.7° C	7.1° C



1.4.4. RELATIVE HUMIDITY :

1.4.4.1. The average monthly relative humidity percentage, recorded at Chandrapur for the period from 1983-84 to 97-98, have been given in Appendix IV(a). The air is generally dry except during the south west monsoon season when the humidity in the afternoon exceeds 70%. The summer months are driest when the relative humidity in the afternoon varies between 20% to 25%.

1.4.5.1.FROST : Frost does not occur in this tract.

1.4.6.1. DROUGHT : Drought like condition is felt during summer when water shortage is felt by regeneration , vegetation and wildlife.

1.4.7.1. STORMS AND WINDS : From October to March North-Easterly and from April to September South-Westerly winds are experienced. Their incidences are not common. Occasional storms occur in pre monsoon period. Thunder storms occur in all the months, their incidence being the highest during the monsoon season and lowest during the winter season.

1.4.8.1. HEALTH CONDITION: The health condition within the tract is not bad. However, skin diseases like leprosy, eczema and water - borne diseases, such as diarrhea,

dysentery are common. Typhoid, Malaria, Fileria and T.B. cases are also observed but in less number. Medical facilities in urban areas are adequate. However, in rural areas people have to travel upto 8 kms for getting medical facilities. Primary health centres exist at Ballarshah, Gondpipri, Kothari, Dhaba, Pombhurna, Rajura, Korpana, Gad Chandur, and many sub-centres have been established at various places. Ayurvedic dispensaries exist at Bhangaram Talodhi, Tohogaon, Kothari, Kunghada and Talodhi Mokasa. Medical facilities extended by industries in the areas like Ballarpur Paper Mill at Ballarpur (Ballarshah), Manickgarh Cement Factory at Manick Garh, Larson and Turbo Cement Factories at Awarpur, and GadChandur, Ambuja Cement Factories and Western Coal Field Limited at various places e.g. Sasti, Ballarpur, Gowari, Wirur etc are also serving the people in a great extend. In interior, even today tribal people mostly depend on local herbal medicines prescribed by vaidu.

SECTION 1.1.5 : WATER SUPPLY :

1.5.1.1. Tanks, wells and borewells from the main sources of water supply. The Wainganga, Painganga and the Wardha are three perennial rivers to add to water supply. In some villages network of pipelines for drinking water has also been established. People of Saknur, Gujar, Chatnadgaon, Kudenadgaon and Hetinadgaon villages even today totally depend upon perennial nals for water. Even drinking water is made available from nals only. Such situation does not exist in other villages of the tract. Scarcity of water is felt during summer when water table recedes and wells and tanks dry up. During this period people obtain their drinking water either from the perennial wells or by digging water holes in the river beds locally known as “Jhira”.

1.5.1.2. The list of existing wells and tanks in the division have been given in Appendix. XVII. In the village Kanhargaon of Kothari Range there is a continuous flow of water from Artesian Well. FDCM has regulated this flow of water by application of Pipe Line that surves permanent source of water for villagers and FDCM Colony in that area.

SECTION 1. 6 : DISTRIBUTION OF AREAS :

1.6.1.1. The total area of the Reserved Forests, Protected Forests and Unclassed Forests under this plan as it stood on 01.03.2003 are **1,17,648.05** ha, **19,647.197** ha, and **5,799.46** ha respectively. Out of which **28,785.315** hectare of Reserved Forests are with Forest Development Corporation of Maharashtra (a Maharashtra State Undertaking) and is being managed under the Management Plan prepared by FDCM. Thus, the net area with Central Chanda Forest Division is **88,862.742** hectare of Reserved Forests, **19,647.197** hectare of Protected Forests and **5,799.46** hectare of Unclassed Forests totaling to **1,14,309.4** hectares. These forests are spread over six Forest Ranges, viz Ballarshah, Dhaba, Kothari, Rajura, Wansadi, and Wirur

1.6.1.2. The distribution of Reserved Forests, Protected Forests and Unclassed Forests by ranges is as given below :

RANGEWISE DISTRIBUTION OF THE AREA (IN HA)

Sr.No	Range	Area of Ranges in ha	Area handed over to FDCM in ha	Total area in ha
1	Ballarshah	16,038.99	0.00	16,038.99
2	Dhaba	5,976.138	13,150.269	19,126.407
3	Kothari	13,185.42	15,635.046	28,820.488
4	Rajura	10,353.11	0.00	10,353.11
5	Wansadi	48,794.662	0.00	48,794.662
6	Wirur	19,961.079	0.00	19,961.079
	Total	1,14,309.399	28,785.315	1,43,094.714

TABLE SHOWING THE RANGE WISE AREAS LEGAL STATUS OF AREAS

Range	Range area in ha Area (ha)	RF Area (ha)	PF Area (ha)	UF Area (ha)
Ballarshah	16,038.99	11,272.926	4,766.06	0.00
Dhaba	5,976.138	3,430.119	2,372.619	176.4
Kothari	13,185.42	6,802.704	6,354.808	27.91
Rajura	10,353.11	9,863.04	367.072	123.00
Wansadi	48,794.662	37,610.764	5,786.638	5,397.26
Wirur	19,961.079	19,883.189	0	77.89
Total	1,14,309.399	88,862.742	19,647.197	5,799.46

(RF = Reserved Forests; PF = Protected Forests, UF = Unclassed Forests, Area is in hectare.)

LEGAL STATUS WISE FOREST AREAS

Sr.No	Legal Status	FD Territorial Area(ha)	FDCM Area(ha)	Gross area with FD Area(ha)
1	RF	88,862.742	28,785.315	1,17,648.057
2	PF	19,647.197	0.00	19,647.197
3	UF	5,799.46	0.00	5,799.46
	Total	1,14,309.399	28,785.315	1,43,094.714

1.6.1.3. The areas of R.F. in Ballarshah, Dhaba, Kothari, Rajura, Wansadi and Wirur Ranges as shown above are not the same as were taken in the previous plans. The difference in areas is due to the following reasons :

(i) Due to disforestation of some area during the previous plan period.

(ii) Due to afforestation of some areas.

(iii) Inclusion of Bhari Forest Block.

(iv) Due to finalisation of allotment of compartments to the FDCM Now there is no ambiguity so far as allotment of areas to the FDCM is concerned. Only R.F. areas are given to the FDCM except at Ballarshah an area of 226 hectares has been given to FDCM for Sale Depot and Administrative Building and Residential Quarters. The list of compartments transferred to the FDCM have been given in Appendix. I(a) The distribution of areas between the department and the FDCM has been given as above.

SECTION 1.7 : STATE OF BOUNDARIES :

1.7.1.1. The old Reserved Forests of Ballarshah, Dhaba and Kothari Ranges which were reserved in the year 1879 have been demarcated by traditional means. The length of external boundary line is 250.04 km, of which 117.60 km is natural features. Artificial boundaries consist of 13 metre (40 feet) cleared line with pillars at suitable intervals. The pillars consist of a central wooden stake of durable timber with pyramidal top surrounded by a cairn of stone or earth. At certain places wooden stakes have been replaced by RCC posts. Total height of the stake is about 2 metres of which about 50 cm projects above the cairn. They are numbered serially anti-clockwise. Each village boundary has separate series of numbers. The demarcation exists but improvement in maintenance is needed. Taking into account the increasing pressure on forest and criminal activities, it is very much essential to demarcate outer boundary of the forests by R.C.C. Pillars of approved design.

1.7.1.2. 322.465 ha P.R.F. in Kothari Range was declared R.F. in the year 1983 but this has not been demarcated so far. Immediate demarcation of the same is needed. Maintenance of compartment boundaries needs improvement.

1.7.1.3. Demarcation of Protected Forests is not seen in the field. Due to this, area is vulnerable to encroachment and some areas have already been encroached. Its demarcation by R.C.C. pillars of approved design is very much essential otherwise this will go on shrinking due to encroachment.

1.7.1.4. Rajura, Wansadi and Wirur ranges form the old Rajura Tahsil. Rajura Tahsil has been transferred as a whole from Hyderabad State to the erstwhile Bombay State and subsequently to Maharashtra State. Earlier this Tahsil was in Nanded District. Later on it was transferred to Chandrapur District. The traverse line running around the tahsil forms the inter-state boundary between Maharashtra and Andhra Pradesh. This traverse line is an artificial one and major portion of it run through forests. The boundary stones, erected at the time of traverse survey of the villages are missing.

1.7.2.1. Further, the tahsil map, published by the Land Records Department, on the scale of 1" = 1 mile, does not tally completely with the printed toposheets published by the Survey of India. Similarly the inter state boundary which forms the western boundary of Mangalhira block is also subject to dispute as boundary demarcation on the ground does not exist. Therefore, the map of 2" = 1 mile scale is used, which was accepted in last plan and the boundaries are also kept as it without any change to avoid the complications. Area involved in boundary dispute (As per DCF Central Chanda there is no dispute over territory only boundary marks are not shown on the ground.) is given in Appendix No I.

1.7.2.2. The external boundaries of Somthana, Mangalhira, Chanai-Barsa I and II, Naranda, Talodhi, Kewitgaon, Erai and Jaitapur are not traceable due to longstanding cultivations. From Kulkarni's plan period these boundaries have not been maintained and at present pillars are also missing at many places. Thus the position of the boundaries in respect of above blocks is very much unsatisfactory and needs to be given urgent attention as prescribed in last plan but not attended at all.

1.7.2.3. Compartment boundaries also not maintained properly and are not traceable in many cases. Statement showing length of external and internal boundary lines by compartments have been given in appendix No XXIX (a).

SECTION:1.8 : LEGAL POSITION :

1.8.1. Descriptions of areas of Ballarshah, Dhaba and Kothari forest range.

1.8.1.1. RESERVED FORESTS : Before the enactment of Indian Forest Act (VII of 1878) forests of Ballarshah, Dhaba and Kothari ranges were in possession of either malgujars or zamindars. The greater part of these forests was declared reserved under section 34, IFA of 1878 by the local Government's (Central Provinces), Gazette Notification No.917 (i), dated the 24th February, 1879. The total Reserved Forest areas covered under this notification and included in Ballarshah, Kothari and Dhaba Ranges is 53081.778 ha. The balanced forest areas remained with Zamindars and Malgujars till the abolition of the proprietary rights in 1951. In 1894 and in the succeeding years the forests were split up into three classes, viz :

A : Areas to be retained permanently as reserves.

B-I : Areas declared available for cultivation.

B-II : Areas not finally placed in either of these classes.

1.8.1.2. Transfers between A and B classes have been frequent. The R.F. area covered in this plan is 25709.636 ha. On the 1st July, 1908 Dhaba Range was transferred from North to South Chanda Division. Out of 50884.808 ha Reserved Forests in three ranges, 12389.77 ha in Kothari and 12685.35 ha in Dhaba Ranges were transferred and handed over to FDCM as per policy decision taken by department. 322.465 ha P.F. areas in Ghosari, Kudesaoili and Parsodi villages of Kothari Range were declared R.F. under section 20 of IFA, 1927 vide Government of Maharashtra Gazette Notification No.WS-5-E - FOR - 1(1975) DESK - IX - II, dated 17th February, 1983.

1.8.1.3: PROTECTED FORESTS : In 1951, the M.P.Abolition of Proprietary Rights (Estates, Mahals, Alienated lands) Act, 1950 (1 of 1951) was passed and all the private

forests possessed by Malgujars and Zamindars within the tract vested in the State Government with effect from 1st April, 1951. Initially they were taken over by the revenue department. Later on the suitable areas were transferred to the forest department for management as per the M.P.Gazette Notification No.2239/286/XVI, dated 9.4.1951 and 7177/CR/617, dated 4.11.1951. The same was declared Protected Forests under section 29 of IFA, 1927 vide M.P.Government Gazette Notification Forest No.3065 - 1216, XI, dated 13th August, 1955 and 1056-12623 FF, dated 08.08.1957. Subsequently, for protected forest areas in Ghosari, Kudesaoili and Parsodi villages the intention to constitute Reserved Forests under section 4 of IFA, 1927 was declared vide Bombay Government Gazette Notification No.FLD - 1258/II-3314-E, dt.August 20,1959. Forest settlement officer was appointed who submitted his report to the Government recommending reservation of 322.465 hectare of Protected Forest area in these three villages. The same was declared Reserved Forests under section 20 of IFA vide Maharashtra Government Gazette Notification No.WS-S-E-FOR-1(1975) DESK IX-II, dated 17th February, 1983. Besides, some Protected Forest areas were disforested from time to time vide Government Notifications, the number of which have been given in Appendix No I. The net protected forest areas available as on mention date 1st July, 2001 as per record is 7142.223 ha in addition to it 6367.372ha is proposed to be Reserved Forests under various gazette notifications. Out of these some areas are under encroachment as well, the list of encroachments after 1978 and rangewise abstract of encroachments before 1978 as per available records have been given in Appendix No XLVI.

1.8.2: Descriptions of the areas of Rajura, Wansadi and Wirur forest ranges of Central Chanda Forest Division.

1.8.2.1: Out of the total area of 75,938.366 hectare an area of 67,494.026 hectare is the reserved Forests declared under section 18 of Hyderabad Forest Act of 1326 F.(1916 A.D.) and section 19 of Hyderabad Forest Act II of 1355 F (1945 A.D.). This area is contained in 10 blocks namely Rajura, Somthana, Chicholi, Siddheshwar I & II, Garlapeth, Manickgarh, Pardi, Kanhergaon and Ahson. The rest of blocks with an area of 6116.849 hectare are Protected Forests. An area of 4602.420 hectare in Mangalhira and Talodhi block was proposed to be reserved forest before the State Reorganisation. But the reservation proceedings were not completed while in earstwhile Hyderabad State and the same have been not attended to since its transfer to Maharashtra State. The statement showing the notifications of reservation of forest as reserved or protected forest have been given in appendix no I of dwpr.

1.8.2.2. In the year 1982, 1288 hectare from Moorti, Chanai Barsa Block I&II, Jaitapur, Kawitgaon, Erai and Naranda Blocks has been proposed for reservation by the Commissioner of Nagpur Division, Nagpur vide his letter No. S/502/FOR-(1981) Desk-IX-II date As per the section 4 of the Indian Forest Act, 1927 (XVI of 1927) in its application to the State of Maharashtra. The said notification has been published in the gazette of the Government of Maharashtra dated 28th August, 1982. The matter needs to be perused. The above proposed Reserved Forests areas were previously declared as Protected Forests under section 29 and 30 of Hyderabad Forest Act II of 1355 F. (1945A.D.).

1.8.2.3. At the time of reservation of Manickgarh block only seven enclaves were shown as excluded though there were as many as 116(of which 77 villages are in Maharashtra) villages of long standing. Out of these 7 enclaves 4 were wholly in the Maharashtra State whereas 2 are completely in the Andhra Pradesh and in case of one enclave some part is in Maharashtra and some part is in Andhra Pradesh (earstwhile Hyderabad State) as per the map prepared by the Hyderabad settlement Officer at the time of reservation. Thus the total area of enclaves, included in the area, handed over to Bombay State is 1979.399 hectare. That area had been excluded from the Working Plan prescription of Kulkarni's plan and Dr Nand Kishor's plan.

1.8.2.4. In Manickgarh block out of the total area of 48378.465 hectare shown against Maharashtra State , 2954.695 hectare area had already disforested. As per the stockmapping which is an ocular estimation an area of 20385.323 hectare is under encroachment or cultivation. A detailed note regarding encroachment and survey carried out by the Land Record Department was given in the last plan which is still pertinent and hence reproduced here.

1.8.2.5. In addition to this area an area of 2327.491ha in Bhari Block of Wansadi Forest Range is being incorporated to Forest Department for the first time as that was earlier in the possession of Revenue Department. That area has status of Proposed Reserved Forests. Thus, the total forest areas of Rajura, Wansadi and Wirur ranges comes to 75,938.366 hectare.

ENCROACHMENT IN MANICKGARH FOREST BLOCK:

1.8.2.6. Initially, the Manickgarh block was the part of earstwhile Hyderabad State. This block was declared as Reserved Forests by the Earstwhile Hyderabad State vide Notification No. Nil dated 18/10/1953 under Hyderabad State Forest Act.

1.8.2.7. As per the above notification, 82945.428 hectare of land was declared as reserved forests. But during the reorganisation of state in 1956, only 48378.465 hectare of land was transferred to the earstwhile Bombay State. As per the record available, it is seen that at the time of transfer of this area, there were 77 helmets.

1.8.2.8. In the beginning of the above area was attached to the Rajura Sub Division and the subdivision was the part of Nanded District. Later on the same was transferred to Chandrapur District.

1.8.2.9. Though the area was thus declared as Reserved Forests, the demarcation was not done on the ground. Later on in the year 1965-66, preparation of working plan was taken in hand for this area by Shri S. B. Kulkarni. During the stockmapping, it was noticed that about 5523.795 hectare of the area was under encroachment or shifting cultivation. But the said areas were neither shown on the maps nor the demarcation was done on the ground.

1.8.2.10. As per the notification declaring the Reserved Forests of Manickgarh block, Seven enclaves were kept unreserved which were excluded from the reserved forest area. However, these areas were not demarcated. Most of the areas of this block is hilly with rugged terrain and undulating topography which extend from east to west. The ancient residents like Gond, Kolam, etc. used to practice shifting cultivation and hunting for their livelihood. Owing to the remoteness and hilly terrain, this area was not accessible from the Maharashtra side. But same was approachable from Andhra Pradesh and Marathwada as the communication facilities were available from the above areas. People from Andhra Pradesh and Marathwada took the advantage of this geographical factor and started to encroach the area. In the beginning, the extent of encroachment by these people was negligible till 1958. These encroachments could not be detected because of the absence of the village boundary and reserve forest boundary. Similarly, cultivated land was also neither shown on the map nor on the ground. As a result, the encroachments could not be detected and if detected, they could not be evicted due to absence of proper demarcation on the ground.

1.8.2.11. Keeping the above facts in view, a survey by Land Record Department was carried out in 1963-64 to demarcate the village boundary and Reserved Forest boundary and show it on the map. But during that survey cognizance of the notification issued in 1953 was not taken at all and the encroached land was allotted to the encroachers by issuing them pattas. In addition to that, most of the land was shown as "Gairan" and "Parampok". In this way, only 15517.316 hectare out of total 48378.465 hectare land was shown as Reserved Forest area. The fact can be easily understood from the following table.

TABLE SHOWING DETAILS OF AREAS OF MANICKGARH BLOCK

Sr No.	Type of area	As per Zaddi Register of 1931 (in ha)	As per Survey carried out by the LR. Deptt. In 1963-64 (in ha)
1	Total area of 77 villages	62,328.960ha.	54,697.804
2	Parampok	21,316.430ha.	8407.845
3	Gairan	571.010ha.	2336.389
4	Kamshetwar	20,255.040ha.	0
5	Pot Kharab	20,255.040ha.	0
6	Gaothan	1857.130ha.	0
7	Kharij Khata	1857.130ha.	0
8	Nala	57.060ha.	0
9	Padit	204.010ha.	0
10	Forest land	48,149.588ha.	15517.316 (RF)

1.8.2.12. Thus major part of the forest land was shown as revenue land and the encroachment area was regularised. That encouraged the encroachers and a result, it was seen that since 1964 encroachments are increasing steadily and continuously. In 1974, approximately 15960.810 hectare of forest land was found to be encroached, in which traditional cultivation was nearly 5519.510 hectare. As per the records, number of encroachers and their caste wise classification was as shown below in 1974:

Caste	No of encroachers.	Caste	No of encroachers	Caste	No of encroachers
Gond	156	Dhiwar	33	Dhangar	10
Kolam	18	Baudha	33	Muslim	114
Laman	668	Kumbhar	5		
Maratha	825	Telangana	18	Total	2358

Gond and Kolam are the native tribes of this area while others are intruders from Marathwada and Andhra Pradesh.

1.8.2.13 ACTION TAKEN AGAINST ENCROACHMENT: These encroachments have been started since 1958 and the offences were registered against encroachers. Keeping in view the increasing tendency of encroachment, combined action was taken by the Forest, Revenue and Police departments in 1969., but the same was stayed by the Government of Maharashtra vide telegraphic order No. LEN/5169/133966B dated 22/5/1969. Even then the Forest Department did not remain silent but struggled hard to evict these encroachments by initiating action from time to time.

1.8.2.14. The above order played an important role in demoralising the forest staff and encouraging the encroachers. As a result during the rainy season of 1969 encroachers started reckless cutting of forest trees and did fresh encroachments in the remaining areas. This stay order was withdrawn on 2/9/1970. Till then, the encroachments were on progress. The seriousness of this problem was put forth before then Chief Minister of Maharashtra on 3/7/1970 and the concerning order was passed on 2.9/1970. During the process two rainy seasons passed and areas were gone under encroachment to a large extent. During the period from July 1969 to March 1971 nearly 8093.7 hectare of forest land was encroached and forests were destroyed by clearfelling the same. During 1971-72 additional encroachment over about 1353.69 hectare recorded and during 1972-73 nearly 969.2 hectare encroachment were noticed. In this way by 1973, 15937.11 hectare of forest land was under encroachment. Out of this, approximately, 12000.00 hectare of forest land was encroached upon by the people of Marathwada and Andhra Pradesh.

1.8.2.15 ATTEMPTS MADE TO DEMARCAT THE BOUNDARY: In 1967-68 survey and demarcation party was formed under the control of Assistant Conservator of Forests. The party started villagewise demarcation of Reserved Forests in the Manickgarh block, but this work could not be completed due to non-availability of concerned maps. In addition to this, people destroyed the land marks fixed by the survey party. Thus, that attempt for demarcation also failed.

1.8.2.16. In 1970-71, Combined attempts for demarcation were made by forest surveyors and foresters, but it was seen that encroachers had continued their encroachment in such a reckless manner that all the land marks around the demarcated area were also destroyed without any hitch and therefore, it was useless to continue this work further.

1.8.2.17. During the period of 1971-72 to 1972-73 the problem of encroachment was very much under control because the patrolling of the mobile squads of Central Chanda Division and West Chanda Division. During the rainy season of 1971 negligible fresh encroachment were noticed.

1.8.2.18. In the month of January-February of 1972, Revenue Department started demarcation of the 3.25 hectare plots on the revenue land for the unknown purpose, it created the rumour that every family is getting 3.25 hectare plot and the encroachment is going to be regularised. It was the time for general election. This rumour encouraged the encroachers and they started calling back their relatives from Andhra Pradesh and Marathwada who had left the area earlier due to the continuous and tireless attempts by the forest department to evict the encroachments. Thus again an exodus of encroachers intruded the valuable forests and started clearfelling of the forest and thus creating new encroachments with vigour on large scale. Forest Officers tried their level best to stop all these gigantic activities. But the situation went out of control.

1.8.2.19. Divisional Forest Officer, Central Chanda Division tried to get the help from Collector and Police officers but in vain. Thousands of Rupees were spent for construction of forest road to facilitate the patrolling for effective control.

FOREST ROADS CONSTRUCTED TO CONTROL THE ENCROACHMENT:

Sr No.	From	To	Length (km)
1	Chandur	Rupapeth	40.4
2	Dhanakdevi	Jioti	9.7
3	Sawalhira	Yelapur	9.7
4	Ergaon	Kodepur	12.9
5	Naokari	Manickgarh	6.5
6	Dewada-Bhaipathar	Manickgarh	32.3
Total			111.5

1.8.2.20. During the period 1-12-68 to 30-6-73, offence cases were registered against the 2985 encroachers, who had encroached over an area of 8148.75 ha Out of these cases 455 cases were transferred to Revenue Department but Revenue Department could evict the encroachments in only 47 cases. Record is not available about the outcome of remaining cases.

1.8.2.21 In 1973, a vigorous combined action by Forest, Revenue and Police Departments launched against the encroachers. The action proved to be quite successful and nearly 500 families were about to go to their native places. But in the meanwhile a rumour spread out that the above action has been stayed by the government. And the encroachers, who were on their way back, again returned and settled.

1.8.2.22 Unfortunately, the above rumour was found to be the fact and the action was stayed by the government of Maharashtra on 14-7-1973. During March, 1974, again the combined action against the encroachers was initiated. Till 15-6-1974, encroachments over an area of 9307.77 ha of land in 54 villages done by 2068 families were evicted as per the Maharashtra Land Revenue Code, 1966. However, it was seen that due to the political pressures and stay

orders issued by the Government of Maharashtra from time to time, evicted encroachments were reoccupied by the encroachers and even they started fresh encroachments in the surrounding forest area. In 1974 following orders were issued by the Government vide order No. FLD/3674/160930, dated. 25-2-1974

- 1) To disforest the 5190.50 hectares of traditionally cultivated land (as per working plan) and to regularise the same by transferring to Revenue Department.
- 2) To dispose off the balance land from the encroachers except the land for which pattas are given by the Revenue Department.
- 3) Forest Department should carry the plantation works on the encroached land (excluding the traditional cultivated land).
- 4) To distribute the 2314.97 hectares of cultivable land to the landless people according to the principles of high power committee.
- 5) For the remaining 2504.19 ha Land of Revenue Department, action should be taken according to Maharashtra Land Revenue Code, 1966.

1.8.2.23 As per the above orders, in 1974, teak plantations were raised on 400.00 hectares of encroached land but the same is not present today on the spot. It might had been destroyed by the encroachers. Similarly, 2814.995 hectares of land was transferred to Revenue Department on 15.4.1974. But the informations regarding the action taken on the other issues are not available.

The Reserved Forest land, as shown below was disforested by Government and declared as unreserved in order to distribute the same among the encroachers.

i)As per Government order No. FLD/3674/160930 F-3, dt. 24-10-79, 2916.51 ha (7207 acres).

ii)As per order No. FLD/3676/142950 P-3, dated, 4.3.1976, 38.123 ha (94 acres).

Thus, in all 2954.694ha area is already disforested.

1.8.2.24. S.B. Kulkarni prepared the Working Plan for this area in 1967-68. As per the plan, major part of the Manickgarh block was kept under selection-cum-Improvement Working Circle and the remaining part was under the Conversion Working Circle. However, during the period 1967-68 to 1985-86, only an area of 7818 ha under the different felling series of S.C.I. Working Circle (Total area of the S.C.I. Working Circle was 44,186.465 ha Area of Manickgarh block), the following area is not useful for forestry works. The statistical information is as shown below :

a)	Land under traditional cultivation	5519.570 ha
b)	Land under encroachment	20385.323 ha
c)	Disforested land	2954.695 ha
	Total :	28859.527 ha

1.8.2.25. A proposal was sent by the Divisional Forest Officer, Central Chanda Division to the Revenue Department to regularise the encroachments over an area of about 9000 hectare which was encroached upon during the period from 1972 to 1978. But as per the letter from Assistant Conservator of Forests, Rajura Sub Division No. WSP/2/483, dt. 8/10th May, 1984, Revenue Deptt. Could regularize only 1713 ha of land covering 63 villages on the Manickgarh hills. Similarly, since there is no demarcation on the ground it is not possible to identify the exact Reserved Forest boundary in situ. Even the encroachments which have been regularised so far have neither been demarcated on the ground nor on the maps. To solve this problem there is only one solution and i.e. to demarcate the area afresh with the help of Revenue and Land Records Department taking into consideration the 1953 notification. With the initiative, taken by the Working Plan Division, D.F.O. Central Chanda had discussed the issue with the F.S.O. Chandrapur and submitted detailed proposals to the Conservator of Forests, South Chanda Circle, for demarcating the area jointly, vide his No. Sur/Demarcation/C/74, dt. 18-4-85. But that was not materialised at all.

1.8.2.26. From the above facts, it is crystal clear that no map can be prepared, showing the exact forest boundary and the encroachments there in the present condition.

1.8.2.27. The special efforts required to manage the encroachment area are described in the miscellaneous regulation.

1.8.2.28. Above report was the part of previous plan. The position thereafter did not improve during the execution of last plan. The efforts taken to evict the encroachment during the september 2002 was not fruitful in the light of strong political agitation and the inadequate knowledge of the extent of forest areas in the tract in the light of above background.

SECTION :1.9 : RIGHTS AND CONCESSIONS (FOREST PRIVILEGES) :

1.9.1.1. There are no rights. Concessions and privileges are given to the agriculturists of certain villages as per the government orders regarding privileges and nistar as follows:

NAGPUR, WARDHA AND CHANDA DISTRICTS:

1.9.1.2. PROTECTED FORESTS : The following privileges are allowed :-

(1) **NISTAR :-** To grant nistar to the villagers as per the limits fixed by the wazib-ul-arz of nistar patrak, the villagers are allowed to remove free of cost thorns, palas etc. for their bonafide use.

(2) **BOMBOOS :-** Dry bamboos only are allowed to be extracted free of cost for the bonafide domestic use. Green Bamboos can be removed at half the sanctioned rates, if this is specifically mentioned in their Wazib-ul-arz.

(3) **TIMBER FOR REPAIRS TO HOUSES :-** The villages are allowed to cut Satkatha trees free of cost for the purpose. Cutting and removal of teak, sal, shisham and semal is prohibited.

(4) **TIMBER FOR BUILDING CONSTRUCTION :-** With permission of the Deputy Commissioner and other revenue Authorities, the villagers can obtain the timber to the extent specified below for the purpose :-

(i) Timber worth Rs.200 or less.	Tahsildar.
(ii) Timber upto Rs. 500	Additional Deputy Commissioner.
(iii) Timber exceeding Rs.500	Deputy Commissioner.

(5) **TEAK TIMBER FOR NISTAR :-** Teak is not given free of cost. If any villager intends to purchase teak, he has to apply for the same to the Revenue authorities. On approval of his application the teak are to be marked by the Forest Department and given to the applicant.

(6) **TIMBER FOR AGRICULTURAL PURPOSES :-** The villagers are allowed to extract the material free of cost from the Forest for the bonafide use.

1.9.1.3. RESERVED FORESTS :

(1) **TIMBER AND FUEL TO THE AGRICULTURISTS :-** Agricultural timber below 24" girth have been supplied at the rates fixed by the Divisional Forest Officer in consultation with the Deputy Commissioner and these rates have been half of the prevalent market rates

(2) Timber above 24" girth is sold to the Agriculturists at the market rates.

(3) **COUPES LEASED OUT TO CONTRACTORS :-** The contractors have to make available the material below 24" and fuel to the quantity as directed by the Divisional Forest Officer for sale to the agriculturists at the rates fixed by the Divisional Forest Officer and the Deputy Commissioner which are 50 percent of the market rates. Whenever the local rate of a head-load of fuel is more than an anna it should be limited to one anna only and if the rate is less than one anna, the lesser rate is to be continued.

1.9.1.4. TIMBER FOR AGRICULTURAL IMPLEMENTS: - The agriculturists are permitted to remove the material required for the Agricultural purposes on rated passes to be issued by the respective village Patels. These passes are to be issued at the scheduled rates prevailing in the District. This concession is to be enjoyed in June and July and from 15th September to 15th November every year.

1.9.1.5.FUEL AND GRASS: - Within the radius of 5 miles from a town they are to be sold to the people only on rated passes at the rates fixed by Government in order to control the rise in prices of these commodities in the markets.

1.9.1.6.FUEL FROM UNMARKETABLE DEAD TREES: - All dead fuel trees are to be cut by Forest Department on a belt of a furlong to either side of the roads passing through reserve forests and are to be sold to people on permits.

1.9.1.7. FUEL FROM WORKED COUPES: - The fuel can be extracted at the prevailing rates. If a piece of wood of more than 8' length is entirely useless as timber and is worth only as fuel, it can be removed. Removal of green piece of wood more than 8' length of prohibited species is not allowed.

1.9.1.8. The Bansods or Burads are allowed to extract up to limit of 1,500 green bamboos per household per year for their small-scale cottage industries at the concessional rates.

1.9.1.9. Timber (except of teak) is to be supplied free of cost to the flood and fire sufferers. Even teak can be given if the Divisional Forest Officer thinks fit to do so from the silvicultural point of view.

1.9.1.10. If the Reserve Forest boundary is adjacent to the Hutments and 'Badis' of the villages, the Reserved Forests boundary may be receded back by 5 chains but the management of this strip have been under the Forest Department. In such cases, the boundary to be demarcated have been of 5' width only.

1.9.1.11.SALAI TIMBER FOR MARRIAGE CEREMONY ETC :- One or two salai trees can be removed at the rate of Rs1.40

1.9.1.12.CONCESSION TO KUMBHARS: - For the preparation of bricks, tiles and other earthen pots, the Kumbhar can get earth and sand free of cost. Whose annual income extends to Rs. 10,000 or who give sales tax cannot get this benefit. Kumbhars have to get written permission from the D.F.O.to burn his kiln.

1.9.1.13. No tax is to be levied for collection of iron ore from the forests. Persons bringing fuel from reserved forests for burning iron kilns have been required to pay Rs.1 as commutation per kiln per year.

1.9.1.14. Edible fruits such as Mahua, Achar can be collected free of cost.

1.9.1.15. Cobblers can get the babool bark on free passes from "Minhai Daraktan" (Sawamitwa Adhikari Jungle). Bark of the marked trees or felling from annual coupes can be given to them at scheduled rates.

1.9.1.16. Construction of bunds in the reserved forests, their maintenance and repairs, digging for water stream in the nalas, is allowed without restrictions except that the villagers are to inform such actions of theirs to the Divisional Forest Officers concerned.

1.9.1.17. Teak fuel from the Departmentally worked coupes and from the contractors' coupes after their leased period is over, can be given to iron smith for preparation of coal to the extent of 36 cart-loads for their bonafide use at the rate of Rs 15 per house-hold as commutation.

1.9.1.18. Carpenters teak (Khod) can be made available to them at the rate of Rs.8 per cartload from the Departmentally worked areas.

1.9.1.19. Brushwood and thorns for fencing :- Where thorns are not available, the villagers are permitted to remove brushwood from departmentally or contractors' felled trees at a scheduled rates. Green thorns and thorny bushes can be cut.

1.9.1.20.MOORAM, STONE, SAND ETC. :- Further repairs of houses, bunds and to burn kilns, the agriculturists can bring earth, mooram, stone, sand, gitti, free of cost from the reserved and protected forests provided the same area is not leased out to some contractors or given to Public Works Department.

1.9.1.21.GRAZING CONCESSIONS :- Two classes amongst the villagers have been drawn e.g.(i) Agriculturists and (ii) Non-Agriculturists. The cattle possessed by the

agriculturists is divided into two categories, viz (i) Agricultural cattle and (ii) Non-agricultural cattle.

(a) Agricultural Cattle includes :-

- (i) An agriculturist possessing 8 and less animal units.
- (ii) Six animal units per plough, if the number of cattle exceed 8 animal units.

(b) CONCESSIONS :- (i) Agriculturists, agricultural labour and carpenter, iron smith, etc. are entitled to graze 4 animal units free and 4 at concessional rates, if he has total 8 animal units or less.

(iii) Those having more than 8 animal units are allowed 6 animal units per plough at concessional rates and the rest at the commercial rates.

Cattle units are decided as under :-

- | | |
|---|----------|
| (1) Cow or bullock more than 3 years age. | 1 unit. |
| (2) Buffalo, he or she more than 3 years age. | 2 units. |
| (3) Calf (young one of cow) more than a Year and less than 3 years. | ½ units. |
| (4) Heiffer (young one of buffalo) of more than a year and less than 3 years. | 1 unit. |
| (5) Calf or heiffer less than a year | Nil |

(c) If a single stray animal or cattle is seen grazing inside the Reserved Forests and adjoining the reserved forests boundary, they are to be driven out of the reserved forests without enlisting any offence against their owners.

CHAPTER – II

THE FORESTS

SECTION: 2.1 : THE COMPOSITION AND CONDITION OF THE CROP :

2.1.1.1. The forests of the tract dealt with under this plan belong to group 5, sub group - 5A, “**Southern Tropical Dry Deciduous Forests**”, as per the revised classification of forest types of India by H.G.Champion and S.K.Seth. Within this main sub-group considerable local variations occur depending mainly upon edaphic, topographic, biotic factors and past treatment. The influence of altitude and aspect is seen in Rajura sub Division where altitudinal variations are prominent. As per the variations in type and depth of soil, the composition and quality of the crop vary. On the basis of the aforesaid factors the forests of the tract being dealt with can be classified as follows :

Forest Types	Champion and Seth's Classification
Group	Tropical Dry Deciduous Forest
Sub-group 5 A	Southern Tropical Dry Deciduous Forest
I. Climax Types:	
(i) 5 A/C _{1b}	Dry Teak Forest
(ii) 5 A/C ₃	Southern Dry Mixed Deciduous Forests.
II. Edaphic Types:	
(i) 5/E2	Boswellia Forests.
(ii) DS1	Dry Deciduous Scrub.

2.1.1.2. Well drained loamy and alluvial soil bears better quality forests. The quality deteriorates on shallow soil and water-logged areas. Types as classified above and their occurrence in relation to the geological formations are described as follows :

GENERAL DESCRIPTION :

2.1.1.3. :- 5A/C_{1b} - DRY TEAK FOREST : This type of forests occur in the tract dealt with. In this type the canopy is fairly closed and trees are of large, tall and well grown. Teak of all India teak site quality III and IV are found there and occurrence of teak in varied quantitative is indication of this type. Rainfall varies from 1000 mm to 1750 mm. Change in floristic composition is more owe to soil composition to rainfall variation. Mixed dry deciduous forest with teak usually forms the major proportion of the crop on shallow porous or stiff clayey soils. This type of forests are mostly found in the tract mostly in Dhaba, low hill forest in Kothari Ranges, major portion of Chicholi block, Western portion of Garlapeth block, in extreme eastern and western portion and also in small scattered patches in Manickgarh block. Due to wide range of variations in edaphic factor, the forests of this sub-type can further be divided into following local sub-types for the purpose of their descriptions.

Puer Teak Forest of Dhaba Range,

Low Hill Forest of Kothari Range and

Teak Forest of Rajura Sub Division.

2.1.1.4. PUER TEAK FORESTS OF DHABA RANGE : Teak constitutes 80 to 90 percent of the total growing stock as most of the areas had been converted earlier. Miscellaneous associates are very less and scattered. The terrain is mostly plain to undulating. The site supports mostly quality III interspersed with II and IV stands with density varying from 0.7 to 0.8.

FLORISTIC :

2.1.1.5. TOP CANOPY : Main associates of teak in top canopy are ain (*Terminalia alata*), bija (*Pterocarpus marsupium*), lendia (*Lagerstroemia parviflora*), dhawada (*Anogeissus latifolia*), bhirra (*Chloroxylon swietenia*), semal (*Bombax ceiba*) etc.

2.1.1.6. MIDDLE STOREY : Though middle storey is not so distinguished yet occasionally occurring species are dhaman (*Grewia tilifolia*), amta (*Bauhinia malabarica*), aonla (*Emblica officinalis*) and bel (*Aegle marmelos*) etc.

2.1.1.7. BAMBOO : *Dendrocalamus strictus* species of bamboo is found mostly along nala banks.

2.1.1.8. SHRUBS : Under growth is very sparse. Species found are dikamali (*Gardenia resinifera*), ber (*Zizyphus mauritiana*), Kuda (*Holarrhena pubescens*) etc.

2.1.1.9. HERBS : Neel (*Indigofera tinctoria*), tarota (*Cassia tora*) and Kutra (*Achyranthes aspera*) etc.

2.1.1.10. GRASSES : Bhurbhusi (*Eragrostis tenella*), Kusal (*Heteropogon contortus*), mushan (*Iseilema laxum*) etc.

2.1.1.11. CLIMBERS : Palasbel (*Butea superba*), waghati (*Capparis* spp), eroni (*Zizyphus oenoplia*), kukranji (*Calycopteris floribunda*) and lalbel (*Ventilago denticulata*) etc.

2.1.2.1. LOW HILL FORESTS OF KOTHARI RANGE : These occur in patches along the nala banks and well drained hill slopes and tops towards the northern boundary of the range. Teak constitutes about 20 to 30% of the total natural growing stock whereas in converted areas it is more than 70%. The lower portion of the dwarf hillocks attain quality III with density varying from 0.6 to 0.7. The forests on the drier side where soil is stony and shallow are mostly of quality IV and fairly open.

FLORISTIC :

2.1.2.2. TOP CANOPY : Main associates are dhawada (*Anogeissus latifolia*), ain (*Terminalia alata*), bhirra (*Chloroxylon swietenia*), moha (*Madhuca latifolia*), Chichwa (*Albizzia procera*), satpuda (*Dalbergia paniculata*), beheda (*Terminalia bellerica*), tendu (*Diospyros malanoxylon*) etc.

2.1.2.3. MIDDLE STOREY : Middle storey consists of garari (*Cleistanthus collinus*), mowai (*Lannea coromandelica*), bel (*Aegle marmelos*), achar (*Buchanania lanzan*), khair (*Acacia catechu*), lokhandi (*Ixora arborea*), amta (*Bauhinia malabarica*).

2.1.2.4. BAMBOO : *Dendrocalamus strictus* species is present all over the tract in scattered patches.

2.1.2.5. SHRUBS : Dikamali (*Gardenia resinifera*), murar sheng/morarphal (*Helicteres isora*), bharati (*Maytenus emarginata*).

2.1.2.6. HERBS : Tarota (*Cassia tora*), diwali (*Tephrosea vellosa*) and *Tephrosea purpurea*, manduli/Gokhru (*Trubulus terrestris*).

2.1.2.7. GRASSES : Bhurbhusi (*Eragrostis tenella*), Kusal (*Heteropogon contortus*), mushan (*Iseilema laxum*).

2.1.2.8. CLIMBERS : Kukranji (*Calycopteris floribunda*), waghati (*Capparis roxburghii*) and palasbel (*Butea superba*).

2.1.3.1. TEAK OF RAJURA SUB DIVISION: Teak in Rajura Sub Division is found in different blocks in different proportion and varied extent. The parent rock in the plain area is sandstone with deep sandy soil and in the hills the parent rock is Deccan trap with black cotton soil in patches laterite with red earth. Proportion of teak in natural forest is 10% to 25% whereas in converted areas it is more than 80%. The proportion of economically important miscellaneous species is 15% to 25%. The quality of crop is III to IV and density varies from 0.4 to 0.7.

FLORISTIC:

2.1.3.2. TOP STOREY: *Tectona grandis*, *Chloroxylon swietenia*, *Anogeissus latifolia*, *Diospyros melanoxylon*, *Terminalia alata*, *Mitragyna parviflora*, *Madhuca longifolia*, *Pterocarpus marsupium*, *Lannea coromandelica*, *Lagerstremia parviflora*, *Schrebera swietenoides*, *Dalbergia paniculata*, *Dalbergia latifolia*, *Bombex ceiba*, *Ferroia elephantum*, *Manilkara hexandra*, *Adina cordifolia*.

2.1.3.3. MIDDLE STOREY: *Cleistanthus collinus*, *Wrightia tinctoria*, *Acacia catechu*, *Zizyphus xylopyrus*, *Emblica officinalis*, *Buchanania lanzan*, *Cassia fistula*, *Bauhinia malabarica*.

2.1.3.4. BAMBOO: *Dendrocalamus strictus*.

2.1.3.5. SHRUBS *Holarrhena antidysenterica*, *Helicteres isora*, *Woodfordia floribunda*, *Bridelia hemiltoniama*, *Gardenia gummifera*, *Indigofera tinctoria*, *Flemingai* species

2.1.3.6. HERBS : Cassia tora, Phoenix acaulis.

2.1.3.7. GRASSES Ischaemum laxum.

2.1.3.8. CLIMBERS: Calycopteris floribunda, Butea superba, Ventilago calyculata, Mucuna pruriens, Abrus precatorius, Acacia pennata.

Reproduction of teak, dhavada, tendu, ain, and garari is coming in patches but is very much inadequate to restock the area.

2.1.4. 5A/C₃ - SOUTH DRY MIXED DECIDUOUS FORESTS :

2.1.4.1. This type occurs in Kothari, Ballarshah Ranges, major portion of Rajura block, north eastern and southern portion of Chicholi block, north western portion of Siddheshwar block, plains forests of northern portion of Garlapeth block, Manickgarh, Pardi, Chanai Barsa I and II, Somthana and Moorti blocks.. In the moist area of this tract bija- semal - polyalthia local sub-type is distinctly seen. Teak constitutes very low proportion in the growing stock. Large sized and well grown bija trees are common in occurrence. The quality of the crop in Kothari Range varies from III to II and density varies from 0.5 to 0.9. The quality of the crop in Ballarshah Range varies from III to IV and density from 0.5 to 0.9 while in Rajura Sub Division area quality is III to IV and density from 0.4 to 0.6. The crop is middle aged to mature.

FLORISTIC :

2.1.4.2. TOP CANOPY : Bija (Pterocarpus marsupium), dhawada (Anogeissus latifolia), tendu (Diospyros melanoxylon), semal (Bombax ceiba), Salai (Boswellia serrata), Chichwa (Albizia procera), beheda (Terminalia bellerica), mowai (Lannea coromandelica) and moha (Madhuca latifolia).

2.1.4.3. MIDDLE STOREY : Karai (Milusa velutina), Kate ain / Kasai (Bridelia retusa/ Flacourtia indica), bhirra (Chloroxynon swietenia), Shisham (Dalbergia latifolia), garari (Cleistanthus collinus), surya (Xylia xylocarpa), khair (Acacia catechu), achar (Buchanania lanzan), lendia (Lagerstroemia parviflora), aonla ((Emblia officinalis), biba (Semecarpus anacardium), bel (Aegle marmelos), rohan (Soymida febrifuga) etc.

2.1.4.4. BAMBOO : Dendrocalamus strictus species of bamboo is found almost every where. Due to flowering in the year 1984, clump formation has not so established all over the areas. Harvestable bamboos are available in Ballarshah and Kothari ranges. Clump formation in bamboo regeneration is getting momentum with passage of time. In artificially regenerated areas also the clump formation has established and need removal of culms to ease the clumps from congestion.

2.1.4.5. SHRUBS : Kuda (Holerrhena pubescens), ghoti (Zizyphus glaberrima), dikamali (Gardenia resinifera), apta (Bauhinia racemosa), ahal (Moringa citrifolia), palas (Butea monosperma), amaltas (Cassia fistula), murar-sheng or murar-phal (Helicteres isora), bharati (Maytenus emarginata).

2.1.4.6. HERBS : Tarota (Cassia tora), neel (Indigofera tinctoria),

2.1.4.7. GRASSES : Bhurbhusi (Eragrostis tenella), Kusal (Heteropogon contortus)

2.1.4.8. CLIMBERS : Eroni (Zizyphus oenoplia), palasbal (Butea superba), Kukranji (Calycopteris floribunda), nagbel (Cryptolepis bchanani), lalbel or papri (Ventilago denticulata).

2.1.5.1. BOSWELLIA FOREST: In these forests salai is associated with moyen and garari.

Proportion of salai is more than 40% of the growing stock in overwood. At places its proportion exceeds 80% over extensive patches tending to from pure salai crop. Next to salai

moyen occurs frequently in overwood and in patches attains the proportion of 10-30% of growing stock in overwood. The quality of crop varies from III to IV and density from 0.4 to 0.6. Most of the areas are in Rajura Sub Division and of these most of the areas are under encroachments and present crops are confined to steep slopes and areas unsuitable for cultivation. Crop is mainly middle aged to mature. Garari is the main species occurring in the underwood. Bamboos are found mainly along the nalas. Undergrowth is comparatively less.

2.1.5.2. FLORISTICS:

I. TOP CANOPY: *Boswellia serrata*, *Chloroxylon swietenia*, *Anogeissus latifolia*, *Diospyros melanoxylon*, *Terminalia alata*, *Mitragyna parviflora*, *Madhuca longifolia*, *Pterocarpus marsupium*, *Lannea coromandellica*, *Lagerstremia parviflora*, *Schrebera swieteniodes*, *Dalbergia paniculata*, *Dalbergia latifolia*, *Bombex ceiba*, *Adina cordifolia*, *Schleichera oleosa*, *Xylia xylocarpa*, *Albizia lebbek*, *Terminalia arjuna*.

II. MIDDLE STOREY *Cleistanthus collinus*, *Brightia tinctoria*, *Acacia catechu*, *Zizyphus xylopyrus*, *Emblica officinalis*, *Buchnanian lanzan*, *Cassia fistula*, *Bahunia malaberrica*, *Butea monosperma*, *Semecarpus anacardium*, *Mallotus philippensis*, *Strychnos potatorum* etc.

II BAMBOO: *Dendrocalamus strictus*.

III SHRUBS : *Holarrhena antidysentrica*, *Helectreres isora*, *Woodfordia floribunda*, *Bridelia hemiltoniana*, *Gardenia gummifera*, *Indigofera tinctoria*, *Woodfordia fruticosa*, *Flemingia species*

IV HERBS: *Cassia tora*, *Phoenix acaulis*.

IV GRASSES: *Ischaemum laxum*, *Andropogon contritus*, *Cymbopogon martini*, *Sorghum spp*,

V CLIMBERS: *Calycopteris floribunda*, *Butea superba*, *Ventilago calyculata*, *Mucuna pruriens*, *Abrus precatorius*, *Acacia pennata*.

2.1.5.3. DRY DECIDUOUS SCRUB FORESTS: It is found in isolated areas mainly Protected Forests of Dhaba and Ballarshah Ranges which are very near to villages and isolated blocks of Rajura Sub Divisions like Kanergaon, Ahson, Talodhi, Naranda, Jaitapur, Kawitgaon and Erai which are also surrounded on all sides by villages. The vegetation is characterised by the stunted growth of the tree species of the dry deciduous forests. A thin grass growth is present during the short moist season otherwise the soil is bare. Climbers are few and mostly zerophytic.

SECTION:2. 2 : INJURIES TO WHICH THE CROP IS LIABLE :

2.2.1. The main causes of injuries to which the crop is liable are as follows :

A : HUMAN AGENCIES

(i) Fire (ii) Illicit cutting (iii) Encroachment

B : ATMOSPHERIC AGENCIES

(i) Wind and hailstorms (ii) Drought

C : OTHER AGENCIES :

(i) Grazing (ii) Wild animals (iii) Climbers (iv) Shrubs

Detailed descriptions of the above are as follows :

2.2.2. HUMAN AGENCIES :

2.2.2.1. FIRE : The forests are deciduous in nature. Falling of leaf normally starts from the beginning of February. The period from February to June is extremely dry and hot. During this period the floor of the forests remains full of inflammable dry leaf litters and therefore the forests during this period are vulnerable to fires. Fire taking place at the end of the winter and beginning of summer is not as severe as that during hot summer. Fire of summer kills the naturally regenerated young seedlings, coppice shoots and plantations too. The growth of surviving seedlings, affected from fire become stunted and their establishment periods become long. During summer most of the areas get burnt more than once. Severe fire causes considerable damage to trees as well by scorching their bases which ultimately leads to unsoundness and hollowness and render them liable to be attacked by fungi and insects. The

fire prevents formation of humus by destroying the microflora and burning out of organic matter. The fire accelerates soil erosion also by destroying the soil cover as well as the organic matters.

2.2.2.2. The main cause of forest fire is the collection of Tendu leaves. Fires are set, illegally, by tendu contractors to obtain profuse leaves from tendu coppice shoots. Fires are also set by local villagers to facilitate movement in the forests for tendu, gum and other forest produce collection. Sometimes, villagers in certain pockets of forest to have good flush of grasses, hunters to do hunting and grazers for no valid reasons set fire in the forest. The persons involved in all reasons of forest fire are mostly local villagers. Therefore, to have effective control over this great problem, it is very much necessary to take the local people in confidence and in consultation with them planning should be done.

2.2.3. ILLICIT CUTTING :

2.2.3.1. The problem of illicit cutting is common in all six ranges. However, gravity, mode of operation and reason of illicit cutting vary from range to range. In Dhaba and Kothari Ranges organised illicit cutting is not so common. The main reason of illicit cutting is done by the local villagers to meet their agricultural and household needs. The scenario in Ballarshah Range is different. The extent of illicit cutting for firewood is very much prominent. Besides, in this area for commercial purpose organised gangs operate along the inter state boundary. The illicit cutting of bamboo is common in division. The magnitude of illicit cutting of bamboo in Ballarshah Range is much more. The illicit cutting and lopping magnitude of tendu trees by tendu contractors have increased due to change in system of tendu collection. In Rajura Sub Division i.e. in Rajura, Wansadi and Wirur Forest Ranges, illicit cutting is mainly for domestic purposes e.g. for construction of huts and agricultural implements and bamboo for various items of bamboo. Another serious nature of illicit cutting is for the clearance of ground to encroach upon the area for cultivation in these areas. People resorted to heavy felling for that purpose in past. But this activity in present is in check. Sometimes interstate gangs operate in organised tree felling. Its nature becomes aggravated when the name of Naxal Protection is given to illicit cutter in the name of Local uses.

2.2.3.2. ENCROACHMENTS : The incidence of Encroachment in a Reserved Forests of the tract dealt with is a rare phenomena in Dhaba, Kothari and Ballarshah tract whereas in protected forests, it is very common. But in Rajura, Wirur and Wansadi tract the distinction between Reserved and Protected Forest is immaterial for encroachers. The lack of proper demarcation and maintenance of the P.F. in first kind of areas and even for R.F. in second type of areas is the main reason for encroachments. The hunger for land and time to time political patronage to encroachers had made the problem much more aggravated. Proper recording by Revenue and Forest departments have been not maintained. Lack of proper and just coordination between these two departments regarding viewing the encroachment as a bane for environment is more hurting the cause of environment. The people having their land adjoining to the forest boundary have general tendency to increase their areas by extending boundaries into the forest area. The complete record of encroachment is not available either at divisional or range level. The boundary between revenue land and P.F. is required to be demarcated and maintained by approved RCC cairn.

ATMOSPHERIC AGENCIES :

2.2.4.1. WINDS AND HAILSTORMS : Strong winds blow during pre-monsoon and monsoon period, causing uprooting of shallow rooted tree species, such as teak, dhoban etc. Occasionally hailstorm damages the fruit crop of moha and achar. Hailstorm in the month of April and May sometimes damages tendu leaves and thereby making them unfit for bidi making.

DROUGHT : Occurrence of drought is not the common feature in this locality. The less moisture retentivity of soil makes the forests susceptible to drought to a considerable extent.

Damage due to drought is restricted to young classes of growing stock and retards the growing vigour of saplings and regeneration.

2.2.4.3. FROST : Frost does not occur in this tract.

2.2.5 : OTHER AGENCIES :

2.2.5.1. GRAZING : The incidence of grazing in the forest surrounded by thickly populated villages is very heavy and is specially noticeable in Ballarshah, Rajura and Wansadi Ranges. The people have Nistar rights in P.F. and privileges in Reserved Forests for grazing of cattle and therefore, forests are vulnerable to grazing. Continuous heavy grazing not only prevents regeneration of tree species to come up and establish but also the young regeneration obtained during the closure is lost soon after the areas are opened to grazing. In grazing with clayey soils the trampling by cattle results in hardening of soil and thereby reduction in the soil aeration. In sandy soils heavy grazing results in accelerated erosion and denudation.

WILD ANIMALS : Browsing of naturally regenerated and planted seedlings by herbivorous animals, particularly by chitals, sambars and barking deer etc. is seen.

INSECTS AND FUNGI : Sporadic attacks of teak leaf skeletoniser (*Eutectona machaeralis*) and teak defoliator (*Hyblea pura*) come across every year in teak patches. Damages from other sources are negligible.

CLIMBER : The common climbers found in this tract are eroni, kukranji, palasbel, ramdaton, chilati and mahulbel. These climbers coppice vigorously and are hardly affected by fire. The damage is caused by strangling of trees when they entwine a sapling or a tree. Usually the apical bud is destroyed. The deep grooves formed by entwining the large trees reduce the yield and value of timber. Epiphytes and ficus species also cause damage.

2.2.5.5. SHRUBS, WEEDS AND GRASSES : The common perennial woody shrubs are murarsheng (*Helicteres isora*), neel (*Indigofera tinctoria*), Jilbili (*Woodfordia fruticosa*) and gursukri (*Grewia hirsuta*). Common weeds found are tarota (*Cassia tora*) and menduli (*Xanthium strumarium*). Common grasses found in this tract are Bhurbhusi (*Eragrostis tenella*), Kusal (*Heteropogon contortus*) and mushan (*Iseilema laxum*). Damage due to above mentioned shrubs, weeds and grasses is seen to some extent in suppressing the naturally regenerated seedlings.

SECTION :2.3 : SOIL EROSION :

2.3.1.1. Soil erosion is the gradual process of loss of top layers of soil which contains humus, organic matters, chemicals and other nutrients on which plants feed. It results in decrease in soil fertility, lowering of sub soil water level, water holding, change of soil structure etc. The soil erosion is prominent in the marginal areas of the Reserved Forests, specially those which are subjected to heavy grazing and illicit cutting. Sheet and gully erosion is found in some parts of Kothari and Ballarshah Ranges. In Rajura, Somthana and Chicholi blocks about 2000 hectare of undulating area around nalas are severely affected by erosion. In these areas top layer of soil had washed away and rills as well as crossable gullies are formed and are progressing further at a fast rate. Even ravine formation in this area is found. Garlapeth, Siddheshwar and Manickgarh forest blocks are also under severe soil erosion mainly due to encroachment and removal of forests of upper areas for cultivation and encroachment.

2.3.1.2. Plant cover acts as a very efficient soil binder, checking the flow of water and helping it to percolate downwards. As a result of ruthless fellings, fire and excessive grazing, the forests thin out, losing power to regenerate and consequently the soil is deprived of its protective covers. With the setting in of the monsoon, the non/unprotected soil cover lies prone to be attacked by millions of little hammer like drops of water. As a result, the soil gets compacted with consequential loss of its absorbing capacity. The suspended soil particles seal the pore spaces of the soil, while the muddy suspension percolates into the earth to such degree, that the soil absorbs but little. The excess water, while running off, removes the top soil in which the organic matters, humus, chemicals and other nutrients on which plants feed are stored.

CHAPTER – III

UTILISATION OF THE FOREST PRODUCE

SECTION :3.1 : AGRICULTURAL CUSTOMS AND WANTS OF THE POPULATION :

3.1.1.1.The local population of the tract consists mainly of agriculturists of various classes, such as Kunbis, Mahars, Gonds, Marars, Kolam, Kawars, Pradhans etc. The Kunbis predominate so greatly in number that the word Kunbis has become almost synonymous with cultivator. Brahmins, Kapewar, Komtis and Kunbis have settled in the prominent villages on the outskirts of forest blocks now connected by affordable all weather roads. Mainly Marathas, Labhans, Mangs,, Gonds and Muslims who have migrated from Marathwada and Andhra Pradesh inhabit the Manickgarh plateau while Kunbis and others dominate the plains. Rest of the communities are interspersed all over. The tracts along the river Wainganga, the Wardha and the Pranhita and the areas along Chandrapur – Allapalli road and Rajura – Awarpur road are comparatively thickly populated. The interior tracts of Ballarshah, Kothari, Dhaba , Rajura, Wansadi and Wirur Ranges are thinly populated and mostly Gonds and other aboriginal are seen in this part.

3.1.1.2.Aboriginal tribes viz. Gonds though tillers constitute bulk of the forest labour during non agricultural season. Their hardiness gets them considerable remuneration through forest works. The economic status of these people is very poor. They are not getting adequate benefit of various Government schemes and are unable to get benefit of reservation policies in services as their educational level is poor. Though the government is taking integrated approach to enhance their socio, economic and educational status of the poor particularly of tribals, the fruit of those schemes have yet to be fully utilised by those concerned.

3.1.1.3.Kunbis, Kapewar, Brahmins and Musalman practice agriculture and are unwilling to work as forest labour. Komtis indulge in traditional money lending and possess extensive areas under agriculture. They are the richest in the tract. Ahirs, Adhars, Kapewars, Khatis and Burad are artisans. Rest of the communities have either small areas under village or no lands at all and they have to depend upon agricultural and forestry activities as labour force to earn their livelihood. Besides, the above communities, golkars and dhangers resort to rearing of cattle, sheep and goats and sale of their produce viz milk, ghee etc. Banjaras are the nomadic herdsmen and resort to rearing of cattle by establishing cattle camps. The labour force consisting of gonds, mahars and other poor communities mainly attend to agriculture on priority and attend to forestry operations during non-agricultural season. In addition, they indulge in collection of edible fruits, such as tendu, mahua flowers and fruits, khirni and achar for their domestic consumption or for sale or barter.

3.1.1.4.The tract dealt with comes under Chandrapur (Part), Ballarshah, Rajura, Korpana, Jioti, Pombhurna, Mul (Part) and Gondpipri Talukas of Chandrapur District. The total population of Chandrapur District, Chandrapur Taluka , Gondpipri Taluka , Rajura Taluka and Korpana Taluka as per 1991 census are 17.72 lakh, 4.7 lakh, 1.09 lakh, 1.33 and 0.95 lakh respectively. Ballarshah was part of Chandrapur and Pombhurna Taluka that of Gondpipri Taluka in 1991. Total geographical areas are 10695 sq.km., 941 sq.km, 1076sq.km, 1242 sq km and 765 sq.km. respectively. Densities of population are 166, 499(Rural 140), 101, 108 and 123. Percentages of urban and rural population of the district are $4.97/17.72 = 28\%$ and $12.75/17.72 = 72\%$ respectively. Talukawise break up of population of Chandrapur District, Gondpipri Taluka and Rajura Taluka as per year 1991 census is as follows:

(POPULATION OF THE TRACT; 1991 CENSUS)

Taluka/ District	Area in sq km	Population/sq km	No of village s		No of towns	No of houses ('000)	No of families ('000)	Popula tion (in thousa nd)		
			Inhabited	Deserted				Male	Female	Total
Ch`pur Dist	10694.9	166	1473	319	12	367	388	9.10	8.62	17.72
Ch`pur Tah	941.9	499	113	13	5	96	102	248	222	470
B`sha	*	*	*	*	*	*	*	*	*	*
Gondpimpri	1076.3	101	144	24	0	23	24	55	54	109
Pombhurna	*	*	*	*	*	*	*	*	*	*
Rajura	1242	108	143	11	2	27	29	70	63	133
Korpana	768	123	127	12	0	19	20	49	46	95
Jioti	*	*	*	*	*	*	*	*	*	*
Total for tract	4028.2	120	527	60	7	165	175	422	385	807

(* Separate figures are not available)

3.1.1.5.The details of workers and non-workers as per 1990-91 census in Chandrapur District, Chandrapur, Gondpimpri, Rajura Talukas are as given below.(Figures are in hundred)

SrNo	Livelihood classes	Chandra pur district	Chandr apur Tahsil	Mul Ta	Rajura Ta	Korpa na Ta	Gondp ipri Ta
1	Cultivators	2425	155	178	195	217	222
2	Agricultura l labourers	2648	166	196	203	164	185
3	Livestock, Fisheries, Forestry etc.	182	52	15	8	9	19
4	Mining Works	290	185	1	24	7	1
5	House hold Services	133	26	11	11	6	12
6	Other than house hold	411	230	11	49	12	5
7	Constructio n work	191	112	5	11	5	4
8	Commertia l worker	336	166	17	19	6	8
9	Transporter work	164	104	5	8	6	2
10	Other services	772	384	27	42	18	24
11	Non workers.	9542	2145	458	720	442	505
12	Total Population	17719	4696	973	1339	948	1089

(Source : Socio-economic review and district statistical abstract of Chandrapur District for the year 1999-2000). The tract dealt with support 5.4 lakh of population.

3.1.1.6. As per the report of Agricultural Directorate, Pune for the year 1988-89, break up of land holding in the Chandrapur District are given as below:

Land holding in hectare	% of land holders
Upto 0.5	11%
0.5 – 1.0	15%
1 – 2	24%
2 – 3	16%
3 – 4	10%
4 – 5	7%
5 – 10	13%
>10	3%

71.28 % of total area under cultivation is being used for food grain cultivation. Among food grains only paddy crop covers maximum 26.7% of areas under cultivation, next comes Jawari with 25.89% and pulse covers 12.91 % of the cultivation area.

3.1.1.7. The percentages of total sown area which is under irrigation in Chandrapur District, Chandrapur, Mul, Gondpipri, Rajura and Korpana Talukas are 30.97%, 30.71%, 47.02%, 13.44%, 34.01% and 16.63% respectively. The main source of irrigation is canal, tanks and wells. Lift irrigation and pumps fitted at nalas and rivers are also used for irrigation purposes. Chandrapur District is not having any major irrigation project and the tract dealt with is not having any major irrigation project and the tract dealt with is not having any either major or medium irrigation project. Villages within the tract dealt with are normally small and cultivable areas are in patches and in a small blocks. Almost all villages are having malgujari tank locally known as Bodi. These tanks are very potential for providing water for both drinking and irrigation purposes. But the potential of these tanks are not being fully utilized. Rice is the main irrigated crop. About 89.10 percent of irrigated area is used for paddy crop. Chilly is extensively cultivated.

3.1.1.8. CATTLE POPULATION as per 1992 cattle census. (Source: Chandrapur District Social and Economic Assessment for 1999-2000)

Tahsil / Category	Chandrapur	Rajura	Gondpipri	Total	Cattle Units
Hybrid ox >2.5 yrs	328	50	1	379	
Hybrid cow >2.5 yrs	2078	262	77	2417	
Native ox >3 yrs	18334	46364	28074	92772	
Native cow >3 yrs	19063	41907	20710	81140	
Hybrid calf ≤2.5 yrs	1129	123	53	1305	
Native calf ≤3 yrs	18606	33939	19336	71881	
He Buffalo >3 yrs	493	256	156	905	
She Buffalo >3 yrs	9514	12481	3462	25457	
Buffalo calf ≤3 yrs	7033	9711	3058	19802	
Cattle					
Horse/Pony/others	4461	857	248	5566	Legally not allowed for grazing in forests.
Sheep	408	2990	1972	5370	
Goat	23481	53960	21794	99235	
Poultry	79036	150641	89298	318975	

NOTE:- Informations for Ballarpur, Pombhurna and Korpana, Jioti are included in Chandrapur, Gondpipri and Rajura Tahsils respectively.

Grazing Pressure: As per the cattle census of 1992 the total cattle in the district is 7.74 lakh. Besides that number of sheep, goat, horse/pony, poultry is 0.42 lakh, 2.53 lakh, 244 and 9692 respectively. Cattle pressure on the forests of tract dealt with is tremendous. Not only the cattle of villages in or around the forest areas depend on forests for grazing but, the cattle from other areas or even herds of nomadic people from other region also intrude in these forests from time to time. The carrying capacity of all the forests of tract including area handed over to FDCM Ltd is worked out to be approximately 1.5 lakh cattle unit. This figure has been arrived at assuming all the forests are made available for grazing and no area remains closed for grazing. But the fact is that some of the area need strict grazing control and kept close for grazing e.g. regeneration areas are closed for grazing and Kuran areas are not opened for grazing but for cutting of grasses for stall feeding. We can easily visualise that the forests are under tremendous grazing pressure.

3.1.1.9. People rear large number of cattle not for milk but for calf and farm yard manure. Besides, the number of cattle in villages is status symbol. Due to large number of cattle, stall feeding is not practiced in this tract. They are left for grazing only in the forests and therefore, the forest area of the tract dealt with is under tremendous pressure.

3.1.1.10. The major population of the tract residing in the rural areas consists chiefly of agriculturists and agricultural labourers. Most of the agriculturists are small and marginal farmers. Majority of the population depends greatly upon the forests to meet their various basic needs. The principal needs for which the people of the tract depend on the forests are as follows :

3.1.1.11. TIMBER : Teak is preferred in building construction, agricultural implements and household furniture. Due to prohibitive price of teak timber its use is beyond reach for the majority of the local population. Therefore, people have to bank upon miscellaneous species to meet out their timber requirement. Miscellaneous timber species in common demand are ain, khair, tiwas, dhaman, bhirra, garari, lendia, hiwar, dhawada etc.

3.1.1.12. FIREWOOD : Firewood is in heavy demand all over the tract. Firewood is mainly used by the local tribal people for cooking and keeping their houses warm during winter. Poor people mainly rely upon firewood to withstand severe cold during winter. They sometimes use firewood to keep wild animals away during nights. Besides, the extraction of firewood by headloaders to earn livelihood as well as for commercial purpose is very common in this tract. The headloaders feed firewood to local towns, cities and even in villages. The forests of Ballarshah and Rajura are heavily burdened with this problem. The forest area set aside for nistar purpose has been exploited to such an extent that except khirni no other species is seen in such areas. Dhawada, khair, bhirra are valued as firewood. The firewood extracted from coupes is sold in auction and purchasers of the same are mostly charcoal manufacturers. Due to all these reasons the pressure of firewood on the remaining Reserved Forests has increased tremendously. Particularly in Ballarshah area the forests are being thinned by headholders. Effective measures to control this problem is to be taken.

3.1.1.13. BAMBOO: Bamboo is popularly known as poor's timber. A local people make use of bamboo in making mainly bamboo articles such as bamboo mats, baskets, grain container, and other articles. The local tribal people use bamboo for house construction, cattle shed, wall of huts, fencing their campus etc. Most of the people bring bamboo from forests of the tract and adjoining forests illicitly. Major portion of Bamboo is used by the paper and pulp industries.

3.1.1.14. GRASSES : Mainly three types of grasses are found in this forest viz. Fodder grass, thatching grass and broom grass. The dry fodder is used to supplement feed to the milching cattle, thatching grass is used for huts and cattle shed making and broom grass is used for making broom. Broom grass is sold by auction at division level.

3.1.1.15. GRAZING : The protected forest areas, set aside for nistar and grazing purposes, have degraded to such an extent that hardly any patch of such area is seen to have grasses.

Privilege was granted for grazing in Reserved Forests as well, but due to degradation of Protected Forests and manifold increasing cattle population the incidence of grazing in Reserved Forests have increased tremendously, resulting in deterioration of R.F. as well.

3.1.1.16.FRUITES, FLOWERS AND LEAVES : Bulk of the inhabitants being poor, resorts to collection of moha flowers and fruits of tendu, khirni and char for their bonafide consumption. Teak and mahul leaves are used for thatching and preparation of rain cover during monsoons. Palas and moha leaves are used for preparation of patra walli (plates) and drona (cups) either for bonafide use during religious or customary functions or for sale to earn livelihood.

3.1.1.17.FIBRES : Palas roots are dug up and cured to obtain floss for making ropes. Twinning climbers and their bark is also put to similar use.

3.1.1.18.OTHER PRODUCTS : Edible tubers and roots are obtained by aboriginals for their bonafide consumption. Thorns are removed to erect or mend their fencing. Gum is collected for sale, barter or local use. Palas and tendu leaves are used for preparing chutta or bidis for local use. The people secure their requirements from the Reserved Forests.

SECTION :3.2 : MARKETS AND MARKETABLE PRODUCE :

3.2.1.1. MARKETS : The forests of the tract dealt with yield timber, poles, firewood and non wood forest produce. Most of the Non Wood Forest Produces are marketed by Tribal Development Corporation under Monopoly Act and are sold by tender at Division level. Timber, poles and firewood after extraction from the coupes are brought to the sale depots and sold in open auction. The main sale depot for timber is at Ballarshah where all better quality timber is brought and sold. However, low quality and less quantity of timber is sold at local depots at Kothari , Gondpipri and Rajura.

3.2.1.2. Timber market at Ballarshah has earned vide reputation and so purchaser from all over the country attend the sale of timber through Government agencies. The market practically disposes of the various trade quality timbers of teak, ain, bija, haldu, shisham, semal etc. Timber sold at Ballarshah Government Timber Depot is graded into the trade qualities in various girth and length classes and is sold in open public auction. Sale by negotiation or supply to Government and other institution is negligible. Ballarshah having Railway station has added facilities for export of timber from this place to various timber consumption centres. Firewood is sold either in situ or at local depots. Firewood is consumed mainly by charcoal manufacturers for charcoal making. Licence for plucking and processing of Tendu leaves are given to contractors by Government through process of tender.

MARKETABLE PRODUCE : The principal marketable forest produce are:

MAJOR FOREST PRODUCES :

Timber and poles,
Firewood,
Tendu leaves &
Bamboo.

B: MINOR FOREST PRODUCES:

Grasses,
Hides and horns &
Other forest produce.

The descriptions of the above are as follows :

MAJOR FOREST PRODUCES:

3.2.2.1. TIMBER AND POLES : Teak and shisham timber are in great demand and fetching very good price. They are sold in all quality, length and girth classes. Other timber species having ready market are bija, ain, haldu, tinsa, tiwas, dhawada, bhirra, khair, rohan, semal, salai etc. Salai, mowai and semal logs above 45 cm girth are preferred for packing cases. Semal logs above 45 cm are used in match industry. Purchasers prefer big sized

timber and pay handsome price. Poles of teak, garari, lendia, ain have competitive local market.

3.2.2.2. FIREWOOD : Dhawada, dikamali, khair, garari are the main firewood species. Firewood is extracted either by working coupes or removal of wind fallen material from the floor of the forests. Firewood is extracted in fuel beats of size 2 mt x 1.2 mt x 1 mt and the same is sold in open auction. Purchasers are mainly charcoal manufacturers. Local demand of the people is met by giving permission of the specified cartloads or headloads to remove from the forest. Ballarpur Paper Mill Limited and BHL are also using the firewood to some extent. Firewood is likely to put to a variety of uses, such as rayon pulp, hard board etc.

3.2.2.3. TENDU LEAVES: Tendu leaves is used as wrapper of bidi. State Government gives the licence for collection and processing of tendu leaves through tender every year. Villagers get handsome wages for collection and processing of tendu leaves. It is one of the most important revenue giving item to government and employment to local people.

3.2.2.4. BAMBOO : There is a heavy demand for the bamboo by Paper Mill Ballarpur. Before flowering of the Bamboo area, bamboos were being harvested by Bilt from all allotted commercial felling series and the local nistar demand of the people was being met from the Nistar Coupes. The other demand for bamboo is of local artisan for making bamboo articles. The tract is potential for bamboo production. Due to gregarious flowering the naturally regenerated seedlings are in the process of clumps formation.

B) MINOR FOREST PRODUCE : As per the Panchayati Raj Amendment Act the ownership of minor forest produces is with Panchayat in Schedule areas and Government of Maharashtra has extended it to Panchayats through enactment.

3.2.2.5. GRASSES : Broom grass is important for revenue earning and is sold by inviting tender at division level. In schedule areas it is with Panchayats to collect and dispose with.

3.2.2.6. HIDES AND HORNS : Hides and horns of wild animals have great demand within and outside the country. Mostly these were exported. These were collected by the licence holder and royalty fixed by the department was paid by them. At present no collection of hide and horns is allowed as per the amendment to Wildlife (Protection) Act.

3.2.2.7. OTHER FOREST PRODUCE : Most of the minor forest produce are collected by TDC through local people. Moha flowers and fruits of tendu, khirni, char and moha are collected by tribal people for their bonafide consumption or sale. Panchayats are empowered to collect and dispose MFP. At present TDC (Tribal Development Corporation, a Maharashtra Government Undertaking), is working for betterment of tribal people in the area. The tract is rich in rocks and minerals. Mainly major minerals like coal, limestone, dolomite etc are being extracted as per the existing laws of the land.

SECTION:3.3 : LINES OF TRANSPORT :

3.3.1.1. RAILWAYS : Chandrapur and Ballarshah are railway stations on the Central Railway (Broad gauge) and Rajura, Vihirgaon, Wirur and Makodi are railway stations on the South Central Railway linking Delhi and Madras. As such Ballarshah, Chandrapur and Rajura are the main market centres able to export bulk of timber, charcoal etc. to various consumption centres in the country. In addition, Chandrapur is also linked to Gondia (Junction on Bombay – Hawrah rail link by broad gauge) and Jabalpur by narrow gauge railway. (S.E. Railway). These two rail links serve the tract dealt with for export of the forest produce therefrom.

3.3.1.2. ROADS : Entire timber and other forest produce is transported from forests to the main market, namely Ballarshah and Chandrapur by roads. A State Highway road connecting Chandrapur and Allapalli and beyond to Sironcha passes through Ballarshah, Kothari and Gondpipri forests. Entire road is fordable through out the year. A number of feeder roads join this main road. Some of important feeder roads are Ballarshah – Chichpalli; Dhanapur – Dhaba; Gondpipri – Khedi. Aksapur – Pombhurna and Kanhargaoon – Zargaon. These remain fordable, almost throughout the year. Similarly, Rajura sub division is connected

with Chandrapur Asifabad(Andhra Pradesh) State Highway. In addition to that the tract is connected with a large number of motorable roads and cart roads. The list of existing roads in the tract have been given in Appendix.

3.3.1.3.RIVER :Very negligible or practically no produce is exported through this medium.

SECTION :3.4 : METHODS OF HARVESTING AND THEIR COSTS

MAJOR FOREST PRODUCE (TIMBER AND FIREWOOD)

3.4.1.1.AGENCY FOR HARVESTING : Till the year 1980 forest coupes for timber and firewood were being worked through three agencies, viz.

Department

ii) F.L.C.S. and

iii) Contractors.

As per the policy decision taken by the Government of Maharashtra vide R & FD No.FCT/1581/93544/F-1, dated 04.04.87, harvesting by contractor system was totally stopped, with a few exceptions, with effect from July, 1981. Now main felling coupes are worked either by the department or through FLCS. Subsidiary silvicultural operations in the coupes are carried out by the department.

3.4.1.2.METHODS OF FELLING AND EXTRACTION :

Usually marking is completed upto the end of previous year and the felling starts after the end of rainy season. Timber trees and poles are felled first and conversion into logs and poles is done by saw. Firewood is prepared with saw and axe. Dragging or carting of timber, poles and firewood upto jungle depot is done by bullock carts and tractors. Transport of the timber and poles from coupe depots to sale depots is mostly done by Government trucks.

(ii) Firewood is cut into billets and stacked in the coupe itself in the form of beats of size 2.0 m x 1.20 m x 1.0 m. It is stacked in the same depot in appropriate lines of 1m height and is recorded in terms of number of beats.

The trees are marked as timber or fuel depending upon its capability of producing timber, pole and firewood. The estimates of volume for timber and firewood are prepared by using local volume factors. After approval of the estimate by the Conservator of Forests concerned, felling operations start.

After felling and conversion into logs and poles, measurements are taken and are engraved at the butt end of the logs, with digital nails, alongwith the tree numbers and number of log. Besides, the marking of passing hammer is also made. Poles are classified by girth classes and their average volume is taken.

After arrival of the logs in the sale depot, they are given serial numbers and measured again. The difference between measurements at the jungle depot and at the sale depot is reconciled.

(vi) All the logging operations are done by engaging local labourers in the departmental working and by the members of the FLCS in case of coupes worked by F.L.C.S. For most of the items of work by job rates are given.

B.TENDU LEAVES :

3.4.1.3. Tendu trade has been nationalized by the Government of Maharashtra Act. No.LVII of 1969. Tendu leaves were collected by the department through agents till 1990 season. After that, it is being sold on lumpsum basis. The different rates of collection for different areas/circles are fixed by the Government. The area of this division has been divided into 26 units which comprise 23 units/working groups. Normally, collection of tendu leaves commences from the last week of April and continues upto the first week of June each year. Tendu leaves are collected by engaging labourers who deliver the leaves at various collection centres called "Phadi". After drying etc bagging of leaves is done at collection centres and then bags are transported to the approved godowns. The quantity of tendu leaves is measured

in standard bag. One standard bag contains 1000 bundles/pudas. Each bundle/puda contains 70 tradable leaves.

C) OTHER NON WOOD FOREST PRODUCE :

3.4.1.4. Moha flowers and seeds, char, gum, honey, edible and non-edible fruits, hides and horns etc are other marketable Non Wood Forest Produce. Most of them are collected by TDC through local tribals. Hides and horns were used to be collected by the licence holders prior to complete ban of collection of hides and horns. The tract is rich in minerals as well.

3.4.1.5. GRASS: Broom grass is sold by auction. Other palatable grasses are used by the local people for their cattle. Coarse grasses are used by the local people for thatching.

Now minor forest produces come under the ownership of Gram Panchayats in schedule areas and respective grampanchayats are responsible for collection and disposal of minor forest produces.

3.4.1.6.COST OF HARVESTING : The minimum wage for different forestry operation is fixed by a committee headed by Conservator of Forests every year. The committee fixes the wage rates based on the prevailing minimum wage rate sanctioned by Labour Commissioner of Maharashtra.

3.4.1.7. CHARCOAL : The manufacturing of charcoal is now prohibited in this tract.

SECTION:3. 5 : PAST AND CURRENT PRICES :

3.5.1.1. As there is a big gap in the demand and supply position of timber and the gap is increasing year after year leading to the increase in price of the forest produce year after year. The statement showing the average market rates for various kinds of timbers prevailing at Government Timber Depot at Ballarshah during the year 2002-2003 and the average rates of fuel beats sold in South Circle from the year 2002-2003 have been given in Appendix No X.

CHAPTER-IV

STAFF AND LABOUR SUPPLY.

SECTION: 4.1: STAFF.

4.1.1.1. The tract dealt with forms the Central Chanda Forest Division and is under administrative control of Deputy Conservator of Forests, Central Chanda Forest Division. The headquarter of Central Chanda Forest division is at Chandrapur. The Deputy Conservator of Forest is the Head of the office. He is Regional Head in respect of Financial Powers conferred by State Government. The tract includes 6 ranges, 17 rounds and 66 beats. The administrative setup of Central Chanda Forest Division is as follows:

Sr.No	Class	Name of the Post	Sanctioned		
			Permanent	Temp	Total
1	I	D. C. F.	1	0	1
2	I	A.C.F.	2	1	3
3	I	F.S.O.	0	1	1
4	II	R.F.O.	8	8	16
5	III	Revenue Inspector	0	1	1
6	III	Forester	44	23	67
7	III	Forest Guard	99	65	164
8	III	Surveyor	2	0	2
9	III	Chief Accountant	1	0	1
10	III	Accountant	5	7	12
11	III	Clerk cum typist	17	3	20
12	III	Steno-typist	1	0	1
13	III	Jeep Driver	6	6	12
14	III	Police Constable	0	1	1
15	IV	Seopy	6	3	9
16	IV	Peon	6	0	6
17	IV	Cleaner	2	1	3
18	IV	Chowkidar	0	2	2
19	IV	Mali	1	0	1
20	IV	Dakrunner	1	0	1
21	IV	Daftari	1	0	1
22	IV	Forest Labour	0	148	148
23		Total:-	203	270	473

R.F.O.s, the Foresters and the Forest Guards are being judiciously utilized. For having better management, not only of the human resources but of the forests in general, reorganisation of the division had been carried out carving protection and development ranges where development units are overlapping units along with territorial units. During the field inspection and discussion with field staffs it was revealed by field staffs that instead of carving of overlapping units it would have been better to have smaller territorial units. Hence some of Beats, Rounds and even Ranges need to be regrouped as in some of the Beats the most of the forest areas have been now under the Management Plan of FDCM This is an administrative measure and needs to be taken at appropriate level.

4.1.1.3. ACCOMMODATION : Accommodation made available by the Forest Department is inadequate. Majority of the staffs members have not been provided with accommodation.

4.1.1.4. REST HOUSE: There is a Forest Rest House at Kanhargaon presently managed by FDCM and Inspection Huts at Rajura, Wirur and Gondpipri.

4.1.1.5.FOREST COMMUNICATION: All the range headquarters are connected to the division by metalled roads. Round and Beat head quarters are connected by the state transport bus service. Division Head Office and all range headquarters have been provided with telephones. Wireless network is being contemplated to have quick communications amongst field staffs and controlling officers for better control of forests regarding illicit cutting and fire control and all forestry related works.

4.1.1.6.OFFICE AUTOMATION: The Division office and all Territorial Range Offices and Depot offices have been equipped with computers and most of the staffs and officers of grade I, II and III have been trained to handle these computers.

SECTION :4. 2 : LABOUR SUPPLY.

4.2.1.1.The position of the labour supply is fairly satisfactory except for some time during the rains when the agricultural works coincide with the afforestation works. Still there is not much of difficulty in procurement of labour for various forestry works.

CHAPTER – V

PAST SYSTEM OF MANAGEMENT

SECTION :5. 1 : GENERAL HISTORY OF FORESTS:

5.1.1.1. Present Central Chanda Forest Division comprises two distinct political and geographical areas. River Wardha divides these two areas completely. North of Wardha river area consists of Ballarshah, Dhaba and Kothari forest ranges. South of Wardha river contains Rajura, Wansadi and Wirur forest ranges. Former area was under erstwhile Central Province State of Union of States just after Independence while later area was under Hyderabad State. Short forest histories of both areas are being discussed as follows.

5.1.1.2. DHABA, KOTHARI AND BALLARSHAH FOREST RANGES: The first authentic record in the ancient history about the tract is the visit of the Chinese pilgrim, Heiun Tsang to the capital of Kosala, the Buddhist king in the year 639 A.D. Various inscriptions reveal that strong kingdom with flourishing civilisation under the rule of Kosala kings was existing around that period over this tract whose capital according to one source was at Chanda and from other sources was at Bhadrawati or Wairagarh. From Kosala Kings territory was occupied by the Mana Kings of Wairagarh. The Gond seized power from the Mana Kings and ruled over the tract from about 1240 to 1751 A.D. The Gond King of Ballarshah founded the Chanda Fort. The Bhosale dynasty (the Marathas) acquired the tract from the Gond Kings and ruled over it from 1751 to 1853. The last king of Maratha Raghuji Bhosale died without heir in 1853 and the Maratha Kingdom was finally annexed by the East India Company to the British Crown in the year 1854. The British ruled over the tract from 1854 to 1947. From 1947 to 1956 the tract constituted part of erstwhile Central Province and later on Madhya Pradesh under Indian Union. In 1956 with the reorganisation of Indian States the areas were with Mumbai and subsequently on bifurcation of the Mumbai State in 1960, it constituted the part of Maharashtra State.

5.1.1.3. BRIEF HISTORY OF THE FORESTS : History of the forests prior to 1879 is not available. After enactment of Indian Forest Act VII of 1878, lot of forest lands, in possession of malgujars and Zamindary were declared as Reserved Forests and the remaining forest areas remained with zamindars and malgujars till the abolition of the proprietary rights in 1951. The total Reserved Forest area in the present Dhaba, Kothari and Ballarshah Ranges is 25709.636 ha. In 1951, the M.P. Abolition of Proprietary Right (Estates, Mahals, Alienated lands) Act, 1951 (1 of 1951) was passed and all the private forests of the district vested in the Government with effect from April 1, 1951. Initially they were taken over by the Revenue Department and later on the areas suitable for management under forest were transferred to the forest department for management. The total transferred forest areas in the present Dhaba, Kothari and Ballarshah Ranges were declared as Protected forests u/s 29 of IFA, 1927 in the year 1955 and 1957 vide Madhya Pradesh Government Gazette Notification No. 30561216-X, dated 04-06-1955 and 1056-12623/FF dated 08-08-1957. The intention to constitute 18986.34 acres ha of P.F. into R.F. was declared vide Maharashtra Government Gazette Notification No.FLD/1258/II-3314-E dated 30.5.1959. As per Maharashtra gazette notification Nagpur Division Supplementary Part –I dated 2nd June 1960 No-II-1837-E for 2504.4.98 acres of areas intention to constitute Reserved Forests was notified. Forest settlement officer after conducting enquiry recommended reservation of 427.752 ha P.F. The proposed PF areas were declared as R.F. u/s 20 of IFA, 1927 vide Gazette Notification No. WS-S-E-FOR-1(1975) DESK-IX-II, dated 17th Febuary, 1983.

SECTION :5.2: PAST SYSTEMS OF MANAGEMENT AND THEIR RESULTS :

5.2.1.1. RESERVED FORESTS : Dhaba and Kothari Ranges of this plan were combined as Dhaba Range prior to 1954 –1955 and Ballarshah Range was the part of Chanda range of West Chanda Division prior to 1965. In the past, the tract dealt with was managed range wise

by separate working plans. Therefore, past systems of management in described separately for Dhaba (old) and Ballarshah ranges as follows :

5.2.1.2. DHABA RANGE (PRESENTLY DHABA AND KOTHARI RANGES) :The Reserved Forests of this tract, constituted in the year 1879, were leased out for about 20 years to purchasers and commuters was indulged in indiscriminate felling of evidently choicest species and quality. In 1899 working plan for these forests were prepared by Punnaswamy, the then Divisional Forest Officer, which was soon abandoned due to non approval of prescriptions there in by the Chief conservator of forests. Thereafter teak forests in the Wainganga tract (Presently Watrana felling series of Dhaba Range) were worked under heavy improvement fellings and the better quality mixed forests in Dhaba Range (Presently Kothari Range) under coppice with standard.

DONALD'S WORKING PLAN OF 1913 :The first regular working plan for these forest was prepared by Donald in 1913. Under this plan Coppice With Standard and Improvement Felling areas were allotted to one felling series each. Felling cycle of 20 years was initially decided but it was raised to 40 years in the year 1924 for felling series in Dhaba Range. In the year 1927, transition felling for coppice with standard in Plain Teak Forest of Dhaba Range was introduced. In the year 1934, these areas were brought under clear felling. In 1932 a special overlapping semal felling series was formed in each range.

5.2.2.2. RESULTS OF DONALD'S PLANS :

The analysis of results of the prescriptions given in Donald's Plan was summarised by Tasdique Hussain which is reproduced as follows :

Inferior mixed forests without teak, occupying large area in all felling series remained unworked for lack of demand.

ii) Better quality mixed forests containing bija and semal in Dhaba Range: Total area was divided into Coppice With Standard and Improvement Felling Working Circles. Thinnings, cultural works and climber cutting though prescribed were neglected. Owing to this, forests were infested with eroni and overgrown with bamboos and poles of shade bearing species. The regeneration status of bija was bad on account of the dense bamboo and valueless underwood. Regeneration and trees of lower girth classes of this species became scarce. Reproduction of semal was also deficient but poles were common. Teak regenerated well in patches.

iii) **PLAIN TEAK FORESTS IN DHABA RANGE :** These forests were managed under coppice with standards for 14 years and then treated under transition felling. The results of treatment under coppice with standard was a general increase in proportion of teak and the creation of a dense underwood of teak poles over topped by standards. Transition fellings were introduced to admit the rapid removal of standards so that the forests could eventually be managed on even aged woods, but their object did not appear to have been understood and standards were removed very sparingly. Since 1934 the forests were worked under clear felling system.

iv) **HILL TEAK FORESTS IN DHABA RANGE :** Large timber of teak and other valuable species were removed under improvement fellings but except in a few coupes worked during the last two years, thinnings, climber cutting and tending operations were badly neglected.

5.2.3.1..N.T. HUSSAIN WORKING PLAN (1937-38 TO 1946-47) :Donald's Plan was replaced by N.T.Hussain's plan in 1937. This included areas of Dhaba, Markhanda, Ghot & Sironcha Ranges. Out of these Dhaba (presently Dhaba and Kothari Ranges) comes under the tract dealt with.

5.2.3.2..OBJECTS OF MANAGEMENT : The objects of management decided were to maintain the forest under the most suitable silvicultural treatment for a sustained supply of timber and other produce and to arrange to meet the local demand for grazing.

5.2.3.3.WORKING CIRCLES : The total areas of the tract were divided into four non overlapping and one overlapping working circles.These are as follows :

Conversion Working Circle.

Improvement Working Circle.

Selection Working Circle.

Miscellaneous Working Circle

Bamboo Overlapping Working Circle.

5.2.3.4. CONVERSION WORKING CIRCLE : Watrana felling series in Dhaba Range of the tract dealt with was included under this working circle.

5.2.3.5. METHODS OF TREATMENT : Improvement felling, CWR and clear-felling all three systems were tried in the past. In improvement felling teak regenerated (naturally) well but the subsequent development in the reproduction was observed to be suffered for want of light. Other two systems worked well. It was observed that teak grew best under full overhead light and in view of this consideration, the general treatment adopted in this working circle was clear felling. For the purpose of giving treatment, forests were divided into following two types :

Those containing a high proportion of teak and sufficient teak reproduction and

Those in which teak does not occur or is found only as poles or reproduction.

The treatment for type (i) decided was clear felling subject to the following reservations.

No felling in under stocked patches.

Semal trees below 3.5 feet in girth were reserved.

In type (ii), ordinarily no felling was prescribed but the improvement in the young teak crop was considered. In such places, therefore, inferior trees standing over teak was prescribed to be removed and any large patches of forest containing profuse teak advance growth were prescribed for clear felling.

5.2.3.6. CONVERSION PERIOD : The average quality of the tract being III, teak above 3 feet in girth is generally found unsound. On the basis of the analysis of data collected from Betul District in M.P., the above size was found to be expected in 60 years and therefore, conversion period was fixed as 60 years.

5.2.3.7. ALLOTMENT OF PERIODIC BLOCKS : The conversion period was divided into 3 periods of 20 years each and allotment was made to all the three periodic blocks. As much as possible old woods were allotted to PBI. Distinction between PB II and III was arbitrary but all the young woods resulting from clear felling in the past were placed under PB III which was again divided into III A and III B, the former included irregular woods and the latter the young even aged stand.

5.2.3.8. FELLING RULES : Felling rules for all PB's and types as mentioned above decided were as follows :

PB-1:

TYPE A : Clear fell all crop after reserving.

Semal under 3 feet in girth.

All growth in poorly stocked patches.

II) TYPE B:

No felling if there was no teak.

If teak reproduction and poles were found scattered or occurred on small groups
removal of inferior trees standing among them.

If there were large patches containing teak reproduction, clear fell entire crop.

PB II : The principal operation in this block was thinning. Revenue felling was strictly prohibited.

The felling rules were

Harvest dead and dying trees.

Make thinning in favour of teak and other valuable species.

Open up teak reproduction if under inferior trees but no felling of teak for
assisting reproduction.

PB III A : The main objects were to provide adequate growing space for teak trees and poles, and to free them from interfering miscellaneous trees. Based on this, felling rules decided were
To harvest dead trees.

To remove unsound trees of the valuable species if likely to die or deteriorate during the next ten years.

To carry out thinning in favour of teak and other valuable species.

To remove inferior trees and unsound teak interfering with teak advance growth but not to fell any sound teak for assisting the advance growth.

To clear entire crop where profuse teak reproduction occurs in large groups under inferior trees.

To cut back suppressed advance growth, malformed or unsound teak poles.

5.2.3.9. PERIODIC BLOCK-III B :

The operations prescribed were climber cutting and thinning. Thinning was intended to be heavy so as to reduce the coppice shoots to one per stool and was also aimed at removal of wolf trees. The other points of importance were :

Poles of seed origin were preferred to coppice.

Coppice from young stools was preferred to that from old stools.

Where teak percentage was tending to pure, poles of inferior species were retained in preference to teak aiming to have a mixture of teak and other species in the ratio of 80:20.

Dominated ghoti and palas trees were retained to protect the soil.

PLANTING AND CULTURAL OPERATIONS :

PB I : After main felling, following planting and cultural operations were prescribed to be carried out in coupes of PB-I.

Planting of teak stumps in the rains after main felling.

Casualty replacement, weeding, climber cutting and cleaning in the second year if needed.

Repetition of operations mentioned in (ii) in subsequent years at the discretion of the Divisional Forest Officer.

Carrying out cleaning, thinning in the fifth, tenth and twentieth year after main felling.

PB-III A : Cleaning, thinning and climber cutting as in PB-I in patches where clear felling were carried out were prescribed.

5.2.3.11. IMPROVEMENT WORKING CIRCLE :

This included workable hill teak and small areas of the plain's teak forest areas of Dhaba Range which formed the part of Karanji felling series only.

5.2.3.12. METHOD OF TREATMENT : Forest areas included were generally on steep slopes and prone to erosion. The proportion of valuable species was small and lead to the market was long. Due to these reasons, instead of intensive management the treatment adopted was improvement fellings, aiming at increasing the proportion of teak and other valuable species. Besides, harvesting of silviculturally available mature trees was prescribed. The operations prescribed for improvement were :

Heavy thinning in favour of teak and semal;

Removal of dead and dying trees.

Cutting back of badly grown unsound teak poles and removal of trees and bamboo likely to interfere with the resulting coppice.

Freeing of teak and semal reproduction from the shade of bamboos and inferior trees.

Clear felling of small patches containing profuse teak reproduction after reserving unharvestable semal.

Teak was considered mature on attaining girths of 4 1/2', 3 1/2' and 2 1/2' forest of II, III and IV quality areas respectively. Semal 3 1/2 feet and over in girth and Saja, Bija, Haldu and Shisham 4 feet and over were considered mature. Marking of only mature and silviculturally available trees was prescribed.

5.2.3.13. FELLING CYCLE AND YIELD REGULATION : The felling cycle adopted was 20 years and regulation of yield was done by area.

5.2.3.14. FELLING RULES : The following felling rules were prescribed.

All salable, dead and dying trees have been removed.

Mature teak, Semal, Bija, Shisham, Haldu and Saja have been removed provided silviculturally available.

Heavy thinnings have been done in favour of teak and semal.

Miscellaneous trees and bamboos interfering with young teak and semal have been removed.

Suppressed teak advance growth malformed or unsound teak poles have been cut.

Cutting back of unsound profuse teak reproduction and clear felling of the whole overwood after reserving semal below 3 1/2 feet in girth.

5.2.4.1. SELECTION WORKING CIRCLE : This working circle included the high quality mixed forests in Dhaba Range (presently Kothari and Dhaba Ranges), which was divided into three felling series for administrative convenience, viz. Kothari, Chiondha, Bamanpalli. Total area of Bamanpalli comes under this working circle in Dhaba Range was transferred to FDCM Kothari and Chiondha felling series comes under Kothari Range and part of these two felling series is included in Aksapur felling series and rest of the area transferred to FDCM

5.2.4.2. This area contained high quality mixed forests with a large proportion of semal and bija with scattered teak. Established reproduction of semal was scarce but poles were common. Regeneration of bija was poor. Teak regenerated well and all size classes were represented adequately.

5.2.4.3. OBJECT OF MANAGEMENT : The object of management was to obtain teak, bija and semal in large sizes and poles of garari, bhirra etc. for local needs.

5.2.4.4. METHOD OF TREATMENT : The method of treatment prescribed was to harvest matured marketable timber trees and thereby providing opening in the forest leading to provide adequate light and space for regeneration and development of valuable species. The various operations prescribed to be carried out were as follows:

(i) **SELECTION FELLING :** This included harvesting of matured semal, teak bija and valuable species.

(ii) **THINNING :** Under this operation felling was carried out to provide adequate growing space for semal, teak and bija left standing.

(iii) **FREEING TEAK ADVANCE GROWTH :** Removal of other trees and bamboos interfering with teak was prescribed. On occurrence of teak advance growth in patches, the entire crop except semal, was prescribed for clear felling. Semal was retained as it has such foliage which does not interfere with the development of young teak.

(iv) **REGENERATION OF SEMAL AND BIJA :** Despite profuse regeneration of both the species during the rains seedlings, these were not persisting for the unknown reasons. As per the observation in the open forests of North Chands Division, both semal and bija were regenerating well. In the flat localities in Dhaba forests, due to dense undergrowth of Bamboo and poles it was guessed that seedlings were being perished for want of light and therefore removal of undergrowth in patches bearing poles of species like garari, dhawada, khair, dhaman, bhirra, lendia etc., required by the local people, was prescribed. This operation was prescribed to be tried on a large scale in Kothari and Chiondha felling series and in 20 acre areas per year in Bamanpalli felling series. Besides, due to non assurance of success of natural regeneration, planting of species in a compact favourable localities was also prescribed. Due to non availability of areas in the worked coupes, planting in other suitable localities outside the coupes was also prescribed.

5.2.4.5.HARVESTABLE GIRTH : The harvestable girths (gbh) decided for teak and semal was 106.68 cm and over and for bija 120 and over. In the year 1940 the harvestable girth for semal was raised to 121.92 cm and in year 1947 the girth limits of both bija and semal were raised to 152.40 cm

5.2.4.6.CHOICE OF SPECIES : The species favoured were teak, semal, bija, saja, shisham, khair, garari, bhirra, dhaman and dhawada.

5.2.4.7.FELLING CYCLE : Felling cycle of 20 years was decided.

5.2.4.8.FELLING RULES : Felling rules prescribed were as follows:

To remove teak and semal 31/2 feet and over and bija 4 feet and over in girth.

To remove mature trees of other species if marketable.

To select patches containing poles of species like garari, khair, bhirra, dhaman, dhawada, lendia etc. required by the local population and clear fell all growth except, teak, semal and bija.

To make heavy thinning for teak, semal and bija including those in the patches treated under rule (iii).

To remove inferior growth standing over scattered teak reproduction. The latter should be cut back if suppressed.

(vi) Where profuse advance growth of teak occurs in patches, cut it back if suppressed and clear fell entire crop after reserving semal.

(vii) Cutting all climbers, specially eroni.

5.2.4.9. During the period 1940-41 to 1945-46 irregular fellings were done in suitable areas of some fellings series and the areas allotted to miscellaneous working circle to meet enhanced demand of supply to department. The fellings which were invariably light were done on sound silvicultural lines. Hence there was no adverse effect of these irregular fellings in the growing stock.

5.2.4.10. Main felling coupes of Watrana F.S. in conversion Working Circle and main felling coupes of Improvement Working Circle were worked in advance during the year 1951-52 as per Government orders to meet the immediate need of funds required by the State Government.

5.2.5.1.MISCELLANEOUS WORKING CIRCLE : This included the forest villages and mixed forests which were not fit for regular management. The area included of the tract dealt with comes presently in both Kothari and Dhaba ranges. The major part of these areas have been transferred to FDCM

5.2.5.2.METHOD OF TREATMENT :

FOREST VILLAGES : Timber in the forest villages was treated as reserved and to be harvested with the permission of the Conservator of Forests. The method of executing felling was prescribed to be the same as for periodic block in Conversion Working Circle.

(ii) **OTHER FORESTS :** The working of such areas was prescribed to be with the adjacent coupes in the regular felling series on the lines of improvement fellings.

5.2.6.1.BAMBOO WORKING CIRCLE : This is overlapping working circle and included areas bearing bamboos. The tract dealt with was covered under four felling series spread over both Dhaba and Kothari Ranges. Most of the part of Dhaba Range and some part of Kothari Range have been transferred to FDCM

5.2.6.2. Bamboo areas were prescribed to be worked in a four year felling cycle.

5.2.6.3.FELLING RULES : The following felling rules were prescribed.

No culm under 1 year of age have been cut.

The height at which culms are to be cut will not exceed 18 inches from the ground.

At least eight culms over 1 year of age have been retained in each clump.

(iv) No dead bamboos have been left in any clump during harvesting.

Digging of rhizomes was prohibited.

5.2.7.1. RESULTS OF TASDIQUE HUSSAIN'S PLAN : The analysis of results of the prescriptions given in Hussain's Plan was summarised by Dashputre which is being reproduced as follows :

5.2.7.2. CONVERSION WORKING CIRCLE : The selection of area for immediate conversion operation was on the whole fairly satisfactory, but a considerable portion of the forests included in this working circle was not likely to be suitable for conversion operations. Such areas were well allotted to PB II or mostly PB III, with the presumption that by the time they come up for conversion, the condition of the crop would be so improved under the treatment prescribed as to render conversion possible. Examination of such areas however, reveals futility of such expectation. In fact the edaphic and biological factors which render such conversion operations impossible now are too permanent to entertain such hopes and a better thing would have been to confine the working circle to such a small areas only wherein intensive working was possible.

5.2.7.3. The clear felling done in Periodic Block – I has produced excellent young woods. The wholesale clear-felling has however, resulted in an absolutely pure teak crop to an undesirable extent. This defect was rectified in the last 5 or 6 coupes in which healthy and vigorous species were retained to obtain a mixture crop to a quite satisfactory extent. The results of conversion are as follows :

Range	F.S.	Coupes	Area in ha		Remarks (% of success)
			Total	Converted	
Dhaba	Watrana	I to XVI	1075.269	763.641	71%

5.2.7.4. In area of PB-II, crop was heavily exploited. Though revenue fellings were strictly prohibited yet large number of mature trees or valuable species were removed. This resulted that some of the areas which were expected to come up for final were deficient in older girth classes. The opening up of teak reproduction under inferior species, however, helped in establishing stand of advance growth in most of the areas. Heavy harvesting also took place in PB IIIA.

5.2.7.5. The tending operations carried out in the young woods as per the prescriptions have brought the stems in healthy and vigorous growing condition.

5.2.7.6. SELECTION WORKING CIRCLE : The regeneration of bija and semal were left to chance due to absence of knowledge of technique. Besides, the prescriptions for using compensatory plantations of 20 ha was too ambitious and so implementation area had to be reduced to 8 ha In the plan it was also laid down to pursue the experiments to evolve a technique for artificial regeneration of bija and semal. But in experiment nothing could come up substantially and so plantation of teak were taken, which became successful in most of the cases. The details of plantation taken are as follows :

F. Series	Area Planted	
	Teak	Mixed
Kothari	66.36 ha	6.069 ha

5.2.8.1. DASHPUTRE'S (1953-54) EXTENDED TO 1973-74: Hussain's Plan was replaced by Dashputre's Plan in the year 1954. This included forest areas of Ghot, Dhaba, Markhanda, Sironcha and Aheri Ranges. Out of these Dhaba (presently Dhaba and Kothari Ranges) comes under the tract dealt with.

5.2.8.2. OBJECTS OF MANAGEMENT : The ultimate object decided was the attainment of a normal growing stock. But this could be left as an unachievable concept and immediate objects decided were as follows :

To meet the local demand for timber, fuel, minor forest produce and grazing.

To preserve the forests where necessary in the interests of conservation of soil and water supply. To meet the demand for timber and other forest produce and to obtain the maximum sustained annual revenue, while at the same time improving the condition of the forest.

5.2.8.3. WORKING CIRCLE : To achieve the objectives as decided above the following working circles were formed.

Conversion Working Circle,
Selection Cum Improvement Working Circle,
Plantation Working Circle,
Coppice With Reserve Working Circle,
Khair (overlapping) Working Circle,
Semal(Overlapping) Working Circle,
Bamboo (Overlapping) Working Circle,
Miscellaneous Working Circle.

5.2.8.4. CONVERSION WORKING CIRCLE : This working circle included teak and mixed forests of III to II quality in Dhaba Range (Watrana felling series) of the tract dealt with.

5.2.8.5. CONVERSION PERIOD : The working circle included teak and mixed forest of quality III to II. Teak formed high proportion in the growing stock. Advance growth of teak was abundant in this locality. The forests were intended to be converted into normal series of age classes in even age blocks. Teak was considered the principal species. However, a mixture of teak (60%) and misc. species (40%) was contemplated. Based on growth data obtained from stem analysis in Watrana felling series, the teak was estimated to attain 4 feet girth in sound condition at the age of 70 years and therefore,, conversion period of 80 years was decided.

5.2.8.6. ALLOTMENT OF PERIODIC BLOCKS : Five Periodic Blocks were formed. Areas were separately allotted to Periodic Blocks. PBI was kept separately. PB II was grouped with PBV and PB III was grouped with PB IV.

PRESCRIPTIONS PROPOSED FOR PERIODIC BLOCKS :

5.2.8.7. PB-1 : The area of Watrana felling series having abundant established reproduction of teak was included in PB-I. Clear felling was prescribed with modification in respect of reservation of miscellaneous poles. Clear felling was restricted in mixed forests containing no teak in the over wood or in the shape of reproduction. Poor quality mixed areas with inadequate stocking and areas prone to erosion were also excluded from clear felling. All semal trees below 137.16 cm in girth, well grown khair trees and fruit bearing trees to the extent of 20 to 25 per 0.4 ha were excluded from fellings. From area liable to erosion only dead trees were prescribed to be removed. Mature or under mature trees standing over the patches of pole crop upto 76.20 cm in girth (bgh) were prescribed to be removed, provided such patches extended over 0.8 ha or more. Thinning was prescribed wherever necessary. Better stocked teak and miscellaneous forests without adequate regeneration of teak were considered unfit for conversion. In such area, removal of mature teak and other marketable misc. species, if available on silviculturaql grounds; bamboos and inferior growth interfering with teak, dead and badly living trees were prescribed. Thinning of required grade was prescribed in congested patches of valuable growth. Plantation was not recommended.

5.2.8.8. Subsidiary, regeneration and cultural operations were prescribed to be carried out in the year following the main felling. Regeneration operation included cutting back of all suppressed and badly grown advance growth, not cut back at the time of main fellings. Cultural operations were prescribed to be carried out in the second, third and subsequent years in the clear felled areas and in the second year in other areas. These consisted of removal of inferior species, overlapping species, climber cutting, cutting of bamboo when

interfering with favoured species, cutting back of sapling seriously damaged by wild animals, clearing the congested groups of sapling and reduction of coppice shoots to one per stool.

5.2.8.9. PERIODIC BLOCK – II : The crop being abnormal and middle aged, removal of all dead trees and trees of inferior species and Karka (bamboos) interfering with reproduction of valuable species was prescribed.

5.2.8.10. PERIODIC BLOCKS-III AND IV : Mature marketable trees of each species were to be ascertained by enumeration and one such tree in every three if available silviculturally was permitted to be removed. Removal of all dead and unsound trees, if available silviculturally and not likely to live for another 20 years was prescribed. Unsound tree was defined as a tree having hollow bole over 3 mt from the base, having half the crown dead, having outer wood of the bole fire scarred and dead to the extent of 1/3 of the bole and very badly leaning. Light thinning in favour of other species, in fully stocked areas were prescribed.

5.2.8.11. Young woods standing over an area of about 930.01 ha regenerated prior to introduction of 1937 plan were subjected to thinnings.

5.2.8.12. PERIODIC BLOCK-V: An area of 3439.95 ha converted to even-aged crops during the period of Tasdique Hussain's Plan and a few years preceding its introduction were allotted to this PB. These, however, contained patches containing irregular crop also. The object of management of these areas was to tend and thin the young woods, to maintain them in healthy and vigorous state of growth and to convert the patches containing irregular crop wherever possible. In the areas successfully regenerated in the past, thinnings in the young crop and removal of standards left over, if any in the past were prescribed. In the irregular, crop, not containing adequate advance growth of teak, removal of overwood leaving a few well grown miscellaneous poles and cutting back of advance growth were the operations, to be carried out. In areas fit for regeneration, removal of mature marketable trees available on silvicultural grounds, removal of dead trees and removal of individual trees to encourage teak and other valuable species were prescribed.

5.2.8.13. PLANTATION WORKING CIRCLE : 3 compartments of the tract dealt with in Dhaba Range (Presently under Kothari Range) near village Kanhargaon were included in this working circle. Total area was put under only one felling series named Kanhargaon felling series which was divided into 30 annual coupes. The main objects of this working circle were to counter balance the paucity of recruitment of valuable species, such as semal, bija, shiwan teak and maharukh and to augment the resources in softwood species in the crop composition and to increase the value of growing stock. Taking plantation of the above mentioned species in each coupe over an area of 6 ha every year was prescribed.

5.2.8.14. Planting in strips by clear felling and treating crop in intervening strips under SCI fellings were prescribed. Annual area was not laid out and selection of the same was left to be decided by the Divisional Forests Officer. Rotation and felling cycle were considered not important for such a small area. Climber cutting, enumeration and removal of 2/3rd of the mature trees without causing any gap in the canopy, removal of dead and dying trees, freeing the regeneration of valuable species by removal of overwood inferior species and thinning in congested patches were prescribed to be carried out in intervening strips.

5.2.8.15. PLANTATION TECHNIQUE : Methods recommended for planting of semal, bija, maharukh and shiwan were as follows :

Semal : Root shoot cutting in manured pits.

Bija : Stumps (Root shoot cuttings)

Maharukh : Sowing in worked soil patches.

Shiwan : Root shoot cutting

Teak : Stump planting.

In view of the heavy porcupine and deer damage, individual porcupine and deer fencing for semal, shiwan and bija were recommended.

5.2.8.16. SELECTION CUM IMPROVEMENT WORKING CIRCLE: This working circle included best quality mixed forests of Dhaba Range which are presently under Kothari Range of the tract dealt with. All the felling series, except Aksapur have now been transferred to FDCM. The quality of the forest varies from III to II. Kakad and Surya are the main species in the growing stock. Bija, Semal and teak occur scattered in the overwood. Dense bamboo occurs all over. Mature trees of valuable species are few. Teak was considered mature on attaining girth of 3, 4 and 5 feet in quality IV, III and II respectively. Bija on attaining girth of 5 feet; Haldu and Shisham 4 feet; Shiwan and Tinsa 3 feet were considered mature. Felling cycle of 30 years was adopted. Yield was regulated by area, except Kothari felling series where it was regulated by number of mature trees.

5.2.8.17. FELLING RULES : The following felling rules were prescribed.

Reservation of all semal and khair trees.

(ii) Total exclusion of felling in under stocked patches.

Selection felling of marketable trees species of harvestable girth if available silviculturally and not required for protection of site.

Removal of dead trees and those which are not dead but of which more than 50% of the crown is dead.

Felling of misc. species interfering with the development of valuable species.

(vi) Light thinning in congested stand to favour semal, bija, teak, ain, shisham, tinsa (tiwas), haldu in order of priority.

(vii) Clear felling small patches with profuse reproduction of teak provided the area is not liable to soil erosion. The limit of patches for such operation was decided not less than 2 acres and more than 10 acres in any one coupe.

5.2.8.18. CULTURAL OPERATIONS : Cultural operations prescribed were-

(i) Climber cutting immediately before a coupe is due for marking.

(ii) CBO after contractor relinquishes coupes and

(iii) Thinning and tending in young woods resulting from past clear felling and planting. A list of such areas drawn on a thinning schedule was prescribed.

5.2.8.19. COPPICE WITH RESERVE WORKING CIRCLE : This working circle included inferior quality accessible area of Dhaba Range (Presently Kothari Range) and was covered within only Dewai felling series which falls within the purview of the tract dealt with. The crop was predominantly mixed and of quality varying from IV to III. Teak was occurring scattered and at times in patches. Important species besides teak were ain, bija, shisham, haldu, dhawada, garari, lendia, bhirra, surya etc. Preponderance of young to middle aged teak and deficiency of old stock were conspicuous.

5.2.8.20. OBJECTS OF MANAGEMENT : The objects of management decided were:

(i) To produce and harvest on sustained yield basis the maximum volume of firewood for charcoal making

(ii) Good straight poles and small to medium sized timber of suitable species to meet the nistar right of the people.

(iii) In a small quantity big sized timber of valuable species from suitable promising trees and

(iv) To provide fodder and grazing to the maximum extent possible.

5.2.8.21. FELLING CYCLE AND COUPES : Felling cycle of 45 years was fixed. The yield was regulated by area by laying 45 equiproductive coupes.

5.2.8.22. METHOD OF FELLING : Semal of 137.16 cm and over and khair of 45.72 and over in girth (Ob at bh) were prescribed to be harvested one year in advance of main felling from areas not allotted to the semal and khair overlapping working circles. Other prescriptions laid down were to be excluded from working the under stocked and areas liable to erosion. Reservation in 20 meter wide strip on either side of main water courses was prescribed. Trees bearing edible flowers and fruits, all bija trees of 121.19 cm and below in girth (Ob at bh) and all trees of *Gardenia latifolia* were also reserved. Besides all advance

growth, except that of garari of 22.86 cm in girth (Ob at bh) was to be reserved. About 30 trees in vigorous state of growth per acre, preferably between 61 cm to 91cm girth classes were to be retained giving preference to valuable species other than teak in pure teak patches to obtain suitable mixture. The species to be favoured were bija, ain, shisham, dhawada, lendia, aonla, tendu, garari, kalam, haldu, tinsa & bhirra. Clear felling garari patches and thinning in pole crop were prescribed. Other trees with above restricting factors were to be felled to obtain coppice reproduction.

5.2.8.23. OTHER SILVICULTURAL OPERATIONS : The following subsidiary operations were prescribed.

Climber cutting before working of the coupe.

CBO after completion of contractors works in the next year of the main felling. CBO included removal of standing trees marked for felling but not felled and badly damaged reserved trees; cutting back of all malformed advance growth of teak and other valuable species; freeing the coppice reproduction from bamboo and cutting of climbers and singling of the coppice shoots:

Cleaning in the 8th year.

Thinning and climber cutting in the 23rd year after the main felling in better quality patches containing teak and other valuable species.

5.2.8.24. KHAIR OVERLAPPING WORKING CIRCLE: This included khair bearing areas of Dhaba Range (Presently Kothari Range) of the tract dealt with. The object of management was to produce and harvest on sustained yield basis maximum khair trees of suitable size. Harvestable girth of 15 inches and above was fixed and felling cycle of 25 years was decided. Only one Kothari felling series was formed. The yield was regulated by area.

5.2.8.25. FELLING RULES : Harvesting of mature khair trees applying selection felling was prescribed. Dressing of stumps of felled trees was also prescribed.

5.2.8.26. SEMAL OVERLAPPING WORKING CIRCLE : The area bearing semal in Dhaba Range (Presently Kothari Range) was included in this overlapping working circle. The object of management was to harvest semal trees of suitable girth to meet the commercial demand on sustained basis. Four and ½ feet girth was decided as harvestable. A felling cycle of 20 years was decided. Two felling series were formed. The yield was regulated by area.

5.2.8.27. FELLING RULES : Selection felling of all semal trees 4½ feet and over was prescribed.

5.2.8.28. REGENERATION OPERATIONS : The method of inducing the reproduction of semal by root suckers was advocated. For this three years prior to harvesting of a coupe 2 to 4 lateral roots around every harvestable semal tree was prescribed to be wounded and the resulting shoots to be fenced individually.

5.2.8.29. BAMBOO OVERLAPPING WORKING CIRCLE : This working circle included all the compartments carrying bamboos in sufficient quantities in Dhaba Range (Presently Dhaba and Kothari Range) of the tract being dealt with. 8 felling series were formed. The felling cycle was fixed four year and therefore, each felling series was divided into four annual coupes. Standard felling rules were followed.

5.2.8.30. MISCELLANEOUS WORKING CIRCLE : This included forest village area and forest of Dhaba Range (Presently Dhaba and Kothari), which were unfit for working due to poor stocking, remoteness and lack of demand, precipitous slope and erosion.

5.2.9.1. RESULTS OF DASHPUTRE'S PLAN : The analysis of results of the prescriptions given in Dashputre's plan was summarised by K. N. Khisti which is reproduced as follows :

5.2.9.2. CONVERSION WORKING CIRCLE : Areas selected for immediate conversion were pure teak stands with adequate growth. These however, contained patches of mixed or pure miscellaneous forests as well. Clear felling the teak forests produced excellent teak

stands. The patches of the mixed or miscellaneous forests were prescribed to be worked to remove only the mature trees of economically valuable species and to free the advance growth of teak and other valuable species by removing the growth of the inferior species interfering with their proper development. This resulted in retention of uncovered patches, scattered all over the area of this working circle of miscellaneous crop. Since the extent of such patches was not big, clear felling and artificial regeneration of teak and other economically valuable species should have been resorted to in order to secure uniform crop all over the converted areas. In laying complete reliance on natural regeneration, retention of the seedling coppice or coppice advance growth as against the coppice of older stools, unless obligatory in certain areas, was presupposed. In practice, poles coppiced from the bigger stools were seen to have been retained, thus inducing deterioration in the quality and retarded vigour of the growing stock. In effect, all the clear felled areas were adequately stocked with uniform crop. Areas regenerated during the currency of the Dashputre's plan were as under.

Range	Felling Series	Coupe No.	Area in ha		Remarks (% of success)
			Total	Converted	
Dhaba	Watrana	I to XX	632.522	600.546	95%

5.2.9.3. The above together with the areas converted during the period of Shri. Tasdique Hussain's working plan amounted to the following hectareage.

Range	Felling Series	Area in ha		Remarks (% of success)
		Total	Converted	
Dhaba	Watrana	1707.773	1364.193	80%

5.2.9.4. In spite of adequate provisions to encourage suitable mixture of teak and miscellaneous in pure teak, patches or wherever teak tended to be pure, the converted crop in Watrana felling series contains low percentage of trees of miscellaneous species.

5.2.9.5. Areas allotted to PBII were seen to have been very heavily worked with the result that the left over crop was mostly middle aged with conspicuous absence of trees of mature and approach classes. This state of affairs could partially be attributed to faulty working for economic exploitation of the Forest Labourer's Co-operative Society. In fact revenue considerations should have had least weightage and the works should have been necessarily carried out as per prescriptions of the working plan.

5.2.9.6. Area constituting Periodic Blocks III, IV and V were adequately attended to. The resultant crop particularly in PBV. Consisted of young and fairly healthy poles.

5.2.9.7. SELECTION WORKING CIRCLE : Bulk of the better quality areas constituting this working circle were transferred to Forest Development Corporation of Maharashtra Ltd. The remaining areas were of medium and low quality forests borne by the hilly and undulating terrain. Bulk of the growing stock was poles to middle aged. Damage due to fire was conspicuous. Mature trees and those of the approach classes were few. In general the growing stock was grossly deficient in higher age classes. Adequate regeneration of valuable miscellaneous species had always been a problem. Compensatory plantations of bija, semal, etc. were intended to be raised. Of late bulk of the stress was laid on raising teak plantations instead of valuable miscellaneous species. Such plantations raised during the currency of Dashputre's plan are reproduced by species as given below :

Range	Species	Area planted in ha
Kothari	Teak	46.537
	Teak and Semal	44.514
	Maharukh	6.069
	Semal	4.047
	Shiwan	6.069
	Total	107.236

5.2.9.8. In addition to the above, plantations of various species to the extent indicated against each one of the following were raised.

Sr. No.	Species	Area in ha
i	Teak	714.818
ii	Teak & Eucalyptus	18.210
iii	Teak & Khair	2.023
iv	Eucalyptus	437.462
v	Bamboos	220.389
vi	Tendu	8.092
vii	Eucalypts, Semal, Maharukh, Siras & Teak	40.468
	Total	1441.562

5.2.9.9. These were raised under various plan schemes with varying degree of success. Teak amongst them showed promising results. Eucalyptus initially responded well till first three to five years after plantations. Subsequently the percentage of mortality increased to a great extent rendering these plantations as total failure.

5.2.9.10. COPPICE WITH RESERVE WORKING CIRCLE : Well stocked area responded well to the treatment and got adequately stocked. Poor quality areas were refractory and no improvement in them was possible.

5.2.10.1. B. BALLARSHAH RANGE: Ballarshah Range was formed in the year 1965. Prior to that it was the part of Chanda Range of West Chanda Forest Division. Initially W.P. was prepared by Ranges.

5.2.10.2. THE WORKING PLAN OF GANGA PRASAD (1897-1900): Ballarshah, Chanda and Moharli Ranges were part of Haveli Range. Ganga Prasad prepared the first working plan for Haveli Range for the period from 1897 to 1900. This working plan presented improvement felling. Forests were worked by petty purchasers who used to remove trees not marked for reservation.

5.2.10.3. In 1910, the system in most of the felling series was changed to coppice with standards, but the felling of the inferior trees was not enforced except in coupes where there was demand. From 1924 onwards cutting back, thinning and climber cutting was done. The forest of Ballarshah Range was regularly worked.

5.2.11.1. VAHID'S WORKING PLAN (1927-37): S. A. Vahid prepared the first consolidated working plan for North Chanda Forest Division, after carrying out detailed inspection of forests, its classification into forest types and quality classes. In the year 1904 only one Forest Division of old Chanda District (Presently Chanda and Gadchiroli) was split up into North Chanda and South Chanda Forest Division due to expansion of work and revenue. For administrative convenience the forests of North Chanda Division were divided into seven ranges, viz Moharli, Haveli (Chanda), Dhaba, Warora, Bramhapuri, Gunjewahi (Presently Sindewahi) and Wairagarh. Later on in the year 1908, Dhaba Range was transferred to South Chanda Forest Division with effect from 1st July 1908. In the year 1924, Moharli Range was divided into Moharli and Mul. The tract being dealt with was the part of Haveli Range (Presently Chanda Range). In 1965 a separate Ballarshah Range was formed. The fundamental principle of forest management to obtain the greatest possible yield was recognised as:

To attainment of normal forest and

To establish regeneration to the normal extent.

5.2.11.2. OBJECTS OF MANAGEMENT : The principal object was considered to manage forests on a financial basis with a view to securing the greatest possible sustained or expanding annual revenue. Besides the role of forests in water conservation and demand of local population were also considered. Based on these considerations, objects of management decided were :

- (i) To obtain maximum possible sustained annual yields.
- (ii) To supply the local demand.
- (iii) To maintain the forest as a forest in the interest of the water supply.
- (iv) To aim at the creation of a normal forest with a normal series of age classes and with normal regeneration.
- (v) With the minimum damage of the forest and the minimum hindrance to the realisation of the above objects to provide grazing to the local cattle.

5.2.11.3.METHOD OF TREATMENT : Subject to the satisfaction of other demands revenue was the main consideration and therefore, the laws of supply and demand were observed.

5.2.11.4. All the species of major importance in these forest being light demanders and therefore, the growth of forests in even aged stands was considered desirable and so the method of treatment was aimed at the conversion of these forests to the uniform system consisting of a normal series of age classes in even aged stands with concentrated normal regeneration. The aim was applied at once to all teak forests and to those mixed forests which were subjected to a good demand.

5.2.11.5. Timber of mixed species was salable only as poles of 18 inches girth or there about and was unstable in larger sizes. Bija was unsalable except as logs of 4 feet girth and upwards. These facts with regard to the demand of different species guided to decide to treat Bija forest (mixed forest with 20% or more Bija) under a system of two storied forest with Bija as the upper storey on a long rotation and other species as an understorey on a short rotation. The French system of coppice with standards method was adopted to achieve above objects. Long term planning with this system of management was to decide either conversion of the area to Bija high forest or low forest on a short rotation based on financial results of these two. More beneficial system (in terms of money) would be followed was intended. Bamboo was found suppressing existing regeneration and preventing the establishment of new regeneration and therefore, it was treated as weed during regeneration operations in the interest of the young growth of valuable tree species. It was recognised that the poor forests degraded usually on account of maltreatment lasting for centuries and so such forests were treated as unworkable and were left untouched as any felling were likely to enhance their further degradation.

5.2.11.6.WORKING CIRCLE : The following working circles were constituted.

- (i) High Forest Working Circle,
- (ii) Coppice With Standards Working Circle,
- (iii) Low Forest Working Circle,
- (iv) Bamboo Working Circle,
- (v) Low Forest Unworked Working Circle.

The better quality forests of Ballarshah Range were worked under low forest working circle. The remaining areas were allotted to low forest unworked working circle.

5.2.11.7.LOW FOREST WORKING CIRCLE : This included low forests of teak or mixed which were not fit for large timber production.

5.2.11.8.SILVICULTURAL SYSTEM : The system selected was modified clear felling. Clear felling was modified to this extent that fruit bearing trees of individual importance to the surrounding population were reserved. Under stocked forest and forest in which the process of filling up by annular group extension was in progress were excluded. The chief source of regeneration was coppice and it was hoped that some natural regeneration on the ground would increase the density of the new crop. It was considered all species as coppicers irrespective of their age and size. Though it was conceded that clear felling had not always been a success in the past. Yet this was bypassed by saying that failure was due to omission of essential prescriptions of cleaning and climber cutting and not due to an inherent defect of the system. This was supported by quoting the following report.

5.2.11.9.“The silviculturist’s report of 1922-23 states: That all our species under coppice treatment show a marked falling off in girth and height is about the 20th to 25th year of their life which is due to the cramping to which they are subjected. This early culmination is remarkably constant even inspite of vast differences in soil and locality generally, and points to the fact that lack of thinning is the root of the evil”. Therefore, thinning after half of rotation age was prescribed. Before thinning climber cutting was prescribed.

5.2.11.10. ROTATION: The financial rotation for misc. species were fixed at 30 and 40 years for the forests of average C.P. site quality of Iva and Ivb respectively. In financial rotation, size of the produce was fixed. The age at which this is attained becomes the financial rotation. For teak financial rotation was fixed at 40 years. Each felling series was divided into 40 to 30 annual coupes as the case may be.

5.2.11.11.FELLING RULES: Felling rules prescribed were:

- (i)To fell all trees within 3’’ of the ground
- (ii)To roughly dress all stumps.
- (iii)To reserve a few Moha and Char trees.
- (iv)To exclude the area from felling which were not likely to regenerate through coppice and the growth of seedling regeneration existing on the ground.
- (v)To reserve a narrow strips of forest along the nalas which were prone to erosion.

5.2.11.12.THINNING: Thinning rules prescribed were:

- (i)Thinning must be crown thinning. Cutting back operation must be carried out.
- (ii)Clumps of coppice shoots must be thinned; the number of shoots to be retained must depend on the crown space available.
- (iii)Big spreading trees of inferior species and miscellaneous trees of more valuable species must be felled if suppressing young growth and if their presence is not otherwise essential which will die as a result of girdling. Dhoban, Ficus species and other which can resist girdling must invariably be felled. Salai must always be felled and not girdled.
- (iv)Creepsrs must be cut.
- (v)Girdling should only be resorted to in case of unsalable trees over 3’’ girth.

5.2.12.1. E. HEWETSON’S WORKING PLAN (1936-37 TO 1945-46): Vahid’s Working Plan replaced by Hewetson’s Plan in the year 1936-37. Vahid’s Plan was for 10 years w.e.f. 1927-28. But it was revised after completing eight years only due to failure of regeneration. The revised plan covered areas of North Chanda Forest Division and was brought into force in 1936-37. Ballarshah Range, the tract dealt with was the part of the then Chanda Range.

5.2.12.2.OBJECTS OF MANAGEMENT : The main objects of management decided were:

- (i)To obtain the maximum sustained yield of all classes of forest produce.
- (ii)To meet the demand of the local people for different forest produce.
- (iii)To retain mixture of species but to favour valuable tree species.

5.2.12.3.METHODS OF TREATMENT : Methods of treatment adopted were:

The better quality forests were managed for production of large timber on a rotation of 80 years.

- (ii) The poorer quality forests were worked on a rotation of 40 years, mainly for the production of poles and fuel to meet the local demand. Regeneration was prescribed chiefly by coppice.

Bamboo was worked on a four year felling cycle.

5.2.12.4.WORKING CIRCLES : The following working circles were formed:

- (i)High Forest Working Circle.
- (ii)Coppice with Standard Working Circle.
- (iii)Miscellaneous Working Circle.
- (iv)Bamboo Working Circle.

5.2.12.5.The workable areas of Ballarshah Range of the tract being dealt with (Then Chanda Range) were allotted to Coppice with standard working circle.

5.2.12.6.COPPICE WITH STANDARDS WORKING CIRCLE : The object to constitute this working circle was to meet local demand for small timber and fuel.

5.2.12.7.METHOD OF TREATMENT : The chief object of management was to satisfy the local demand for small timber of size from 15 to 24 inches girth for which coppice with standard system was adopted. Clear felling was not adopted due to following reasons:

(i)Teak was not common and to increase its proportion the retention of teak standards was desirable.

(ii)Semal and bija were valuable and salable only over 3 feet girth and so healthy trees below that size were not to be sacrificed.

(iii)The demand for large timber of ain, shisham, tinsa etc. was increasing and it was desirable to retain standards of these species in order to meet this demand.

(iv)In poorly stocked forests, on steep slopes and other erosion prone areas, clear felling was likely to lead to further deterioration.

(v)Fruit bearing trees were to be retained because local villagers depended on them in a variety of ways.

5.2.12.8.CHOICE OF SPECIES : Teak, bija, tinsa, shisham and shiwan were proposed to receive preferential treatment in selection of standards for reservation during subsidiary operations and thinnings.

5.2.12.9.ROTATION : A rotation of 40 years was adopted in all felling series. The number of rotations of the coppice for which the standards were to be retained could not be fixed as that was largely dependent on the rates of growth of individual species and on the future demands. 40 approximately equiproductive coupes were laid down in each felling series. Yield was regulated by area.

5.2.12.10.METHOD OF EXECUTING THE MAIN FELLINGS : The following felling rules were adopted

(i)Demarcation and marking were prescribed one year advance of the main felling. At the same time climber cutting was also prescribed.

(ii)Poor or under stocked forests, steep slopes and areas prone to erosion were excluded from working, but felling departmentally of dead, dying and over mature marketable trees was prescribed.

(iii)All sound well grown semal and bija below 4 feet girth were reserved.

(iv)Sound, straight teak, ain, shisham, shiwan, bhirra and tinsa were reserved as standards. Girths between 15 to 24 inches were prescribed for selection of standards.

(v)In open forests and in places where coppice reproduction was likely to be deficient, retention of a larger number of standards to protect soil and reduce growth of grass were prescribed.

(vi)Trees bearing edible flowers and fruits liked by local villagers were reserved.

(vii)A belt of trees, especially Koha was retained along all important water courses.

(viii)All seedlings and saplings upto 9 inches in girth, except garari were reserved.

(ix)All well grown stems of phetra (Gardenia turgida) and ghogal (Gardenia latifolia) were reserved.

5.2.12.11.THINNING : In the fifteenth year of main felling C-grade thinning and climber cutting were prescribed. In departmentally worked coupes subsidiary operations were not prescribed. In coupes worked by contractor, CBO was prescribed.

5.2.12.12. FELLING IN BAMBOO AREAS: Cut back of bamboo for a year or two before the main felling was prescribed to retard the growth of bamboo for providing the coppice regeneration a better chance of getting established.

5.2.12.13.RESULTS OF WORKING : The analysis of results of prescriptions given was done by Singh and Muzumdar which is being reproduced as below

(i)The results of the treatment on the above lines were, on the whole quite satisfactory in the new bamboo forests of Brahmapuri, Sindewahi and Wairagarh Ranges. But in places larger trees failed to coppice satisfactory. In the bamboo bearing forests heavy fellings produced disappointing results. Bamboos and climbers came up more vigorously and smothered the young reproduction. Advance bamboo felling was found to be expensive and was abandoned.

(ii)The subsidiary cultural operations and thinnings after 15 years were not carried out properly.

5.2.12.14.BAMBOO OVERLAPPING WORKING CIRCLE : This working circle overlaps coppice with reserve working circle of Ballarshah Range. Some compartments of Ballarshah Range were included in Chanda Commercial Bamboo Felling Series which were allotted to Ballarpur Paper and Straw Board Mill Ltd. On lease of 40 years. The remaining areas constituted part of Chanda Nistar Bamboo Felling Series.

5.2.12.15. FELLING CYCLE : Initially felling cycle was decided 4 years. But it was reduced to 3 years in the year 1965-66. Since then 3 year felling cycle was followed.

5.2.12.16. FELLING RULES : The following felling rules were framed.

(i)No felling of culms under one year of age.

(ii)A minimum of 8 culms over one year in each clump were to be retained. (The minimum may be increased or decreased by executive orders of C.F.)

(iii)The height at which culms was to be cut was maximum 18 inches.

(iv)No dead bamboos were to be left in clumps, harvested.

5.2.13.1. S.N.SINGH AND R.B. MUZUMDAR'S WORKING PLAN (1949-50 TO

963-64): Hewetson's Plan was replaced by Singh and Muzumdar's Plan. Ballarshah Range, the tract being dealt with was the part of then Chanda Range. Singh included all R.F. areas in Ballarshah Range under management. In all previous working plans two felling series, namely Itoli and Umri (of the current plan) were not included under management. These areas were brought under management in Singh's Plan for the first time.

5.2.13.2. During the preparation of this plan all the 'A' class forests were stock mapped showing the quality classes and types of the forests. Quality classes were fixed on the arbitrary limits of the heights. Under stocked areas and blanks too were indicated. However, density and regeneration of the crop were not indicated on topo-sheets.

5.2.13.3. Forests were classified for the first time on functional basis into tree, minor pasture and miscellaneous forests. Forests which could not produce large sized timber but grew medium sized timber, poles and firewood were classified as minor forests.

5.2.13.4. OBJECTS OF MANAGEMENT : The objects of management decided were :

(i)To obtain the maximum sustained yield of all kinds of produce.

(ii)To satisfy the local demand for small timber, firewood and other minor forest produce and conserve as far as possible those tree species which produce edible fruits and flowers.

(iii)To provide grazing to the maximum possible extent consistent with the silvicultural requirements for maintaining the forests perpetually productive and to maintain and improve the pasture in areas specially set apart for grazing purposes.

(iv)To satisfy the local and export demands for large sized timber and export demand for firewood and charcoal.

(v)To satisfy the demand of industries for timber, bamboos and other produce.

(vi)To increase the proportion of valuable species such as teak, semal, bija, shisham etc. in the forests by the preferential treatment and planting. Pure crops were discouraged and suitable mixture was prescribed to maintain in the growing stock.

(vii)To combat the ill effects of soil erosion whenever it had started and to prescribe preventive measures against further soil erosion.

(viii)To aim at the creation of normal forest with all that it implies.

(ix)To conserve species suitable for the plywood industry wherever they occur.

5.2.13.5.METHOD OF TREATMENT : Forests were classified on functional basis into tree, minor, pasture and miscellaneous forests. This treatment for each class was given on the basis of its requirements.

5.2.13.6.WORKING CIRCLE :The following working circles were constituted.

- (i)Plantation Working Circles.
- (ii)Selection Cum Improvements Working Circles.
- (iii)Coppice With Reserve Working Circles.
- (iv)Pasture Working Circles.
- (v)Miscellaneous Working Circles.
- (vi)Bamboo overlapping Working Circles and
- (vii)Semal overlapping Working Circles.

5.2.13.7.The tract dealt with under this plan was allotted mainly to Coppice With Reserve Working Circle and some compartments, such as 444, 445,455,492B,493,494,512 and 521 were allotted to miscellaneous working circle. Bamboo bearing areas were allotted to Bamboo overlapping working circle.

5.2.13.8.COPPICE WITH RESERVE WORKING CIRCLE : This working circle included all workable areas of Ballarshah Range and were divided into five felling series. The crop was mixed and Characterised by the presence of a great variety of species.The chief objects of the management of these forests were to supply on a sustained basis small sized timber, poles, firewood, fodder and grazing to the maximum possible extent. Treatments for both areas having dense and less bamboo were prescribed separately. Method for regeneration was prescribed by coppice. Rotation of 40 years was adopted for all felling series and accordingly 40 equiproductive coupes in each felling series were formed. Yield was regulated by area.

5.2.13.9. FELLING RULES : The felling rules prescribed were :

5.2.13.10.A: COUPE CONTAINING A FEW OR NO BAMBOOS

- (i)Precipitous and steep slopes, under stocked areas with density below 0.4 and areas prone to erosion were excluded from working. However, marking of dead and over mature trees was left to be decided by the Divisional Forest Officer.
- (ii)All tree growth on either side of the main water courses upto a width of one chain were reserved, felling of dead, dying and over mature trees was left on the discretion of the Divisional Forest Officer.
- (iii)All edible flowers and fruit bearing trees were reserved.
- (iv)All Semal and Bija trees below 4 1/2 feet girth were reserved in view of their commercial importance.
- (v)Gardenia latifolia was reserved.
- (vi)The species suitable for plywood industry were prescribed to be reserved.

In addition to the above reservation, other reservations prescribed were:

All advance growth except garari upto 9 inches in girth.

In areas where coppice growth from the main crop and the advance growth were likely to be adequate, sound and well grown teak, ain, shisham, shiwan, bhirra and tinsa were reserved. Trees upto 2 feet but less than 3 feet in girth were selected for reservation. The number of trees to be reserved was prescribed not below 30 per acre.

In well stocked areas where teak tending to be pure in sufficient extensive patches, well grown poles of species other than teak and garari were reserved to obtain a suitable mixture.

d) In areas with medium or low stocking, all well grown healthy trees except garari were reserved. The number of reserved was prescribed from 40 to 50 per acre. Trees providing shade and protection to the soil were preferred.

e)Thinning if necessary, in patches containing pole crop was prescribed.

f)Clear felling of garari was prescribed.

5.2.13.11. B.FORESTS CONTAINING BAMBOOS. In the coupe containing dense bamboo, judicious felling of bamboo three years in advance of the main felling to allow the existing reproduction of the tree species to be established was prescribed. Density of over wood was prescribed to be maintained where the reproduction was scanty to keep down bamboos, weeds and grasses. C.B.O. was prescribed in the year following the year of main felling. Climber cutting and cleaning were prescribed to be carried out in the 8th year from the year of main felling. Thinning was prescribed in the 20th year after the main felling in the better quality teak and mixed forests. All coupes were closed to grazing for a period of seven years from the year of working. However, in moderately grazed areas 3 years closure was prescribed after mid rotation and in heavily grazed areas besides above closure, monsoon closures were also prescribed.

5.2.13.12. MISCELLANEOUS WORKING CIRCLE: The following types of areas of the tract being dealt with were allotted to this working circle.

(i) Forests which were too remote to be harvested.

(ii) Hilly areas with an open stocking.

(iii) Forest villages.

5.2.13.13. METHOD OF TREATMENT: These forests were not prescribed for regular working. However with the permission of the Conservator of Forests, removal of dead and dying trees and selection-cum improvement felling in any area were prescribed.

5.2.13.14. BAMBOO OVERLAPPING WORKING CIRCLE: This working circle overlapped with above two non overlapping working circles. Some of the compartments were allotted to Chanda commercial B.F.S. which was allotted to Ballarshah Paper and Straw Board Mills Ltd.; on lease for 40 years. The remaining compartments were allotted to Chanda Nister B.F.S. The bamboo felling series were recasted in the year 1965-66 as the felling cycle was reduced from 4 to 3 years.

5.2.13.15. FELLING CYCLE: Felling cycle was decided four years as was changed to 3 years in the year 1965-66.

5.2.13.16. FELLING RULES: The following felling rules were decided:

(i) No felling of culm under one year of age.

(ii) The maximum height at which culms were to be cut was prescribed 18 inches.

(iii) A minimum of 8 culms over one year of age was prescribed to be retained in worked clumps.

(iv) No dead culms were to be retained in worked clumps.

5.2.13.17. The analysis of results of the prescriptions was summarized by Khisti which is being reproduced as follows

(i) Areas without bamboos regenerated well . However, in the area subjected to heavy grazing, especially in small isolated blocks, the regeneration failed to establish and severe soil erosion became visible.

(ii) In areas bearing bamboos, bamboo felling 3 years before the main felling was not carried out and due care was not taken to keep the over wood dense where the regeneration was sparse. Due to this bamboos and climbers infested such areas eliminating the regeneration over large portions.

(iii) Mid rotation thinnings were allotted to be unusually heavy amounting to revenue felling and trees reserved at the time of main felling were found to be removed against the prescriptions.

5.2.14.1. K.N. KHISTI'S WORKING PLAN (1979-80 TO 1993-94): Reserved forests of Dhaba Range of Dashputre's Plan and part of Chanda Range (Presently Ballarshah Range) of Singh and Muzumdar's Plan were included in this plan. Dhaba Range of Dashputre's plan was divided into the present Dhaba and Kothari Ranges in 1959. Thus this plan covered Reserved forest areas under Ballarshah, Kothari and Dhaba Ranges.

5.2.14.2.OBJECTS OF MANAGEMENT: The objects of management decided were

- (i)To mitigate the effects of soil erosion and to preserve and promote vegetative cover on precipitous hill slopes.
- (ii)To meet demand for small timber, firewood and bamboo.
- (iii)To meet the outside demand for large sized timber, firewood and charcoal to the extent the forests can bear.
- (iv)To provide grazing facilities for cattle to the extent compatible with scientific management of this forests.
- (v)To enhance potential value of the forests by raising plantations of important species particularly teak.
- (vi)To remain progressively increasing yield of timber and firewood on sustained basis with due regard to silvicultural requirements of the forests.
- (vii)To attain normal forests.
- (viii)Consistent with above, to derive maximum financial benefits.

5.2.14.3.WORKING CIRCLE:The following Working Circles were formed:

- (i)Conversion Working Circle.
- (ii)Coppice with Reserve Working Circle.
- (iii)Miscellaneous Working Circle.
- (iv)Bamboo overlapping Working Circle.

5.2.14.4. CONVERSION WORKING CIRCLE: This included Watrana Felling Series of Dhaba Range and a portion of the Aksapur SCI felling series of Kothari Range under Dashputre's Plan. Total compartments included were 31. Total area covered was 4981.686 ha only one Watrana felling series was formed.

5.2.14.5. OBJECTS OF MANAGEMENT:The objects of management decided were

- (i)To manage the forests permanently as high forests for the production of big sized timber.
- (ii)To convert the irregular crop into the normal series of age gradation in even aged blocks.
- (iii)To secure sustained yield in perpetuity.
- (iv)To meet the demand of commerce and industry in respect to teak and other species.
- (v)Consistent with (iv), to meet the local demand for forest produce to the best possible extent without impairing the productive capacity of the forests.
- (vi)Consistent with the above to derive maximum financial benefits

5.2.14.6. SILVICULTURAL SYSTEM: Clear felling and regeneration by natural means was adopted and wherever necessary regeneration by planting the annual area was also prescribed.

5.2.14.7. CHOICE OF SPECIES: To maintain suitable admixture of teak and miscellaneous species bija,ain,shisham, tinsa, haldu, semal, khair, dhawada, lendia, tendu and bhirra were chosen.

5.2.14.8. ROTATION AND CONVERSION PERIOD: On the basis of stump analysis carried out during preparation of working plan rotation was decided 100 years and considering the annual planning potential conversion period was decided 60 years.

5.2.14.9. DIVISION OF AREAS INTO PB's : Total areas were divided into 4 PB's and consequently the conversion period (60 years) was divided into 4 period of 15 years and allotment was made to all four PB I. Areas covered was 1240.370 ha PB II and PB III were clubbed together. This included areas under PB II,III and IV and some areas of SCI in Aksapur felling series in Dashputre's Plan. Area covered was 2513.50 ha PB IV was allotted, regenerated areas during Dashputre's Plan under PB I and under plantation working circles. Area covered was 1227.813 ha

METHOD OF TREATMENT:

5.2.14.10. PB I: 15 Annual coupes were formed. Clear felling annual coupes with following exceptions was prescribed.

(i) Area prone to erosion were excluded from clear felling and soil conservation operations were prescribed.

(ii) 20 metre wide strips along either bank of the perennial nalas was reserved against felling.

(iii) Sound fruit trees of local economic importance were retained.

5.2.14.11. (a) Prescriptions for the regeneration was both by natural and artificial means. (b) Clear felling in areas containing patches of advance growth, (c) thinning in healthy groups of young poles and (d) planting in areas having no advance growth were prescribed.

5.2.14.12. PB II & III: This included mostly irregular and middle aged crop. Removal of dead trees and trees of inferior species interfering with the development or reproduction of valuable species was prescribed. Mature trees or trees approaching to maturity were prescribed not to be touched.

5.2.14.13. PB IV: Suitable tending and thinning operations were prescribed to be carried out.

FELLING RULES:

5.2.14.14. PB I : The area was divided into following types and marking rules for each type were prescribed separately.

(a) Unworkable area.

(b) Areas with natural regeneration as an advance growth.

© Plantation areas.

(d) Areas to be clear felled for plantation.

5.2.14.15. MARKING RULES:

5.2.14.16. General : Application all over the areas of PB I:

(i) Cutting of climber at the time of marking.

(ii) Retention of crop in 20 metre wide strips on either side of the nalas, roads and removal of dead, Overmature and very unsound trees not required on silvicultural ground.

(iii) Retention of healthy semal trees wherever available.

5.2.14.16. Rules as per above mentioned types:

(a) Unworkable areas: No marking of any trees.

(b) Area with natural regeneration in advance growth : clear felling crop and cutting back advance growth to give seedling coppice.

(c) Plantation Area: Appropriate thinning operation was prescribed if it contained pole crop.

(d) Areas to be clear felled for :

Clear felling and planting with teak was prescribed in area suitable for teak. In patches unsuitable for teak valuable miscellaneous species such as bija, khair, semal were prescribed to be planted. In plantation 3 weedings in the first year, 2 weedings in the second year and one weeding in the 3rd year; cleaning in 5th year, 1st mechanical thinning in 7th year and 2nd mechanical thinning in 15th years were prescribed.

PB II & III : Rules prescribed were

(a) Climber cutting at the time of marking.

(b) Thinning marking in congested crop in favour of teak and other superior timber species to make the spacing $1/3^{\text{rd}}$ of the average height of the crop.

© Marking for felling of all dead trees.

(d) Marking of dead, over mature and very unsound trees for removal unless to for retention on silvicultural ground.

5.2.14.18. PB IV : The following operations were prescribed to be carried out: (a)Cleaning cum thinning of suitable grade.

(b)Removal of overwood interfering with the growth of valuable species such on teak, bija and shisham.

©Cutting back of malformed advance growth and removal of dead and dying trees.

Climber cutting.

(d)1st and 2nd mechanical thinnings in th 7th and 15th years in plantation of teak and other species were prescribed.

OTHER REGULATIONS:

5.2.14.19. FIRE: Coupes in PB I were treated as class I under which complete protection for a period of five years was prescribed.

5.2.14.20. GRAZING: i) Coupes of PB I were closed to grazing for a period of five years after the year of working.

5.2.14.21.COPPICE WITH RESERVE WORKING CIRCLE: Low quality forests of Kothari and Ballarshah Ranges were allotted to this working circle. Five felling series (already in previous plan) in Ballarshah Range and four felling series (New) in Kothari Range were formed. The name of Dongarhaldi Felling Series of Ballarshah Range in Singh and Muzumdar Working Plan was changed to Umari Felling Series in this plan. Besides, compartment of Ballarshah Range allotted to Miscellaneous Working Circle in Singh's Plan was allotted to C.W.R. in adjoining felling series. None of the compartments of Ballarshah

Range was allotted to other working circle. Total 79 compartments were included, out of which 42 were from Ballarshah and 37 from Kothari Range.

5.2.14.22. OBJECTS OF MANAGEMENT: The main objects of management decided were:

To improve the condition, composition and density of the tree crop and ensure adequate regeneration by appropriate silvicultural system.

(ii) To meet the local nistar demand for small timber, poles and firewood.

To meet local requirement of fodder and grazing and

Consistent with the above to obtain maximum outturn of small sized timber and firewood, not only to meet the local demand but also for export of surplus forest produce and thereby obtaining maximum financial benefit.

5.2.14.23.SILVICULTURAL SYSTEM: The individual system adopted was coppice with reserve. This system provided for reservation of valuable tree species and retention of vegetative cover in the eroded areas or areas prone to erosion. This system resolved into: (i)Coppicing all growth and attained maturity and retention of which was not essential either for silvicultural or protection reasons.(ii)Reservation of trees which were capable of producing timber of big sizes.(iii)Reservation of growth in eroded areas and areas liable to erosion.

5.2.14.24. CHOICE OF SPECIES: Teak was favoured most. Besides teak, bija, ain, shisham, haldu, tinsa and kalam were given preferential treatment.

5.2.14.25. ROTATION AND REGULATION OF YIELD: Rotation for the coppice was fixed at 40 years and accordingly 40 annual coupes in each felling series were laid down. Yield was regulated by area.

5.2.14.26. METHOD OF EXECUTING FELLING: For executing felling, coupe area was classified into following four types:

A: Unworkable area.

B: Areas fit for clear felling with some reservation.

C: Areas to be clear felled for raising teak.

D: Remaining areas (density 0.4 to below 0.7).

5.2.14.27. FELLING RULES: The following rules for above types of areas were laid down.

A: UNWORKABLE AREAS:

Climber cutting and

Felling of dead trees were prescribed.

B: AREA FIT FOR CLEAR FELLING WITH SOME RESERVATIONS.

Marking for felling all trees except the following:

(i) All well grown advance growth upto 30 cm in girth.

(ii) Well grown poles of teak, bija, semal, shisham, and haldu upto 45 cm in girth.

(iii) All healthy trees of moha, char, tendu and aonla which bear edible flowers and fruits.

(iv) All well grown trees of semal, khair, bhirra and behada which had special economic importance.

(v) In blanks, too small for exclusion from working, healthy living trees of any shape, size and species.

(vi) Besides, climber cutting at the time of marking, thinning in congested pole crop of favoured species and removal of deformed and suppressed advance growth of timber were prescribed.

C: AREA TO BE CLEAR FELLED FOR RAISING TEAK: Clear felling of all the trees, except young healthy semal and planting with teak at 2m x 2m interval as per the standard method were prescribed.

D: REMAINING AREAS: In these areas marking for improvement felling consisting of the following operations were prescribed:

(i) Cutting of all climbers and high live stumps of illicit felling.

(ii) Felling of dead, dying and unsound trees.

(iii) Thinning in the groups of saplings and poles of teak, bija, shisham, ain and haldu to obtain spacemen 1/3rd of the average height of the crop.

5.2.14.28. SUBSIDIARY SILVICULTURAL OPERATIONS :

The following silvicultural operations were prescribed to be carried out :

(i) Cutting back operations in next year of the main felling.

(ii) Cleaning in the sixth year after the year of main felling.

(iii) Thinning at the half rotation age i.e. on 20th year of main felling in the pole crop only. But no felling of reserved unless they were uprooted or badly damaged.

MISC. REGULATIONS :

FIRE PROTECTION : The complete fire protection for the worked areas for the period of seven years from the year of working was prescribed.

(ii) **GRAZING :** The worked coupes were prescribed for closure to grazing for a period of seven years from the year of working.

5.2.14.29. MISCELLANEOUS WORKING CIRCLE : This included compartment No. 154 of Dhaba Range and 8A, 78(p), 101, 530a, 531a compartments of Kothari Range. Compartment No. 530a and 531a are those areas which were declared RF in 1983. Areas included were mostly under stocked, extensively eroded and forest village areas.

5.2.14.30. METHOD OF TREATMENT : No. regular working was prescribed. However, irregular harvesting for the purpose of meeting demand of local people, for free grant and for departmental use was prescribed. Felling prescribed was of the nature of improvement felling which included felling of dead, dying, over mature and unsound trees provided their retention was not essential for site protection or other silvicultural reasons.

5.2.14.31. BAMBOO OVERLAPPING WORKING CIRCLE: Bamboo bearing areas in Kothari and Ballarshah Ranges were included in this working circle. Total area is covered under 76 compartments of which 36 belong to Kothari Range and 40 belong to Ballarshah

Range. These were divided into five felling series, out of which three were allotted to Nistar and two were retained as commercial felling series. Out of compartments in Kothari Range allotted to this working circle, compartment number 79 and 115 were transferred to FDCM Ltd.

5.2.14.32. OBJECTS OF MANGEMENT : The objects of mangement decided were:

- (i) To harvest bamboo on scientific lines.
- (ii) To obtain maximum yield on sustained basis.
- (iii) To meet local demand for bamboos.

5.2.14.33. FELLING CYCLE : The felling Cycle of 3 years was adopted.

5.2.14.34. FELLING RULES : Following felling rules were framed :

- (a) No felling was permitted during monsoon i.e. from 15th June to 30th September.
- (b) Following culms were prescribed for felling irrespective of maturity.
 - (i) Dead and decaying culms of which growing shoots were cut to the length more than 1/3rd of the normal length or culms badly damaged and unsound.
 - (ii) Twistead, bent or otherwise malformed culms.
- © A clump was not considered mature unless it contained more than 8 mature (more than one season old culms) culms.
- (d) In a mature clump, the following types of culms were prescribed to be retained.
 - (i) All current season's culms.
 - (ii) From the rest culms equal in number to the current season's (less than 1 year old) culms or eight whichever is more.
 - (iii) Culms silviculturally available for harvesting were prescribed to be harvested in such a manner that the clump was worked evenly.
 - (iv) Culms on the periphery of the clump were retained unless essential to facilitate working in the interior portion of the clump.
 - (v) The height between 15cm was prescribed for cutting.
- (e) Harvesting was prescribed to be deferred in case of flowered clumps till the completion of seedling.
- (f) The following acts were strictly prohibited.
 - (i) Digging of rhizomes.
 - (ii) Cutting of tops of bamboos for fodder.
 - (iii) Use of tender bamboos for bundling.
- (g) Using sharp instrument for cutting was insisted.
- (h) Removal of climbers infesting bamboo clumps was prescribed.

5.2.15.1. RESULTS : The following features are noticed in the crop :

- (i) In coppice with reserve working circle, no coppice could come out from stumps of miscellaneous species as all miscellaneous species did not respond well to coppice. Some unhealthy coppice of teak is seen.
- (ii) Valuable miscellaneous species which are seen in the crop are those which were reserved during the main felling in the previous working plans.
- (iii) The percentage of valuable species in the crop is very less.
- (iv) Natural regeneration of certain miscellaneous species is seen and this is the hope for the future crop.
- (v) Subsidiary silvicultural operations to boost up or assist natural regeneration of bamboo to establish were not carried out in flowered areas.
- (vi) Bamboo flowered and consequently its regeneration suppressed the natural regeneration of miscellaneous species.
- (vii) The mid term evaluation of prescriptions in terms of regeneration was not done.

(viii) Despite regeneration not responding to treatments given all coupes were allowed to be worked as if main felling has no relevance to regeneration. However, as a matter of fact is that the main objective of the main felling is the regeneration only.

(ix) In conversion working circle, the mode of regeneration adopted was by natural seedlings supplemented by planting. The area is by and large regenerated and plantations away from human habitation are mostly successful.

(x) Other silvicultural operations in such areas appeared to be not attended as per prescriptions. Thinnings are required to be carried out with the help of yield table and climber cutting should be carried out on priority basis through out the area.

(x) Bamboo flowering took place in the year 1984 in this area. Area is full of young bamboo seedlings, but they are still to form a clump. Sporadic clump formation is seen but these are not harvestable.

(xi) After flowering no efforts are seen to have been made for boosting establishment of bamboo regeneration. The experiment of selecting healthy and well spaced bamboo seedlings and doing weeding and soil working around them was carried out in some patches. The result was encouraging, but such operations were not applied in whole area.

(xii) Heavy biotic interference is seen through out the tract. The quantum of illicitly removal of firewood by head-load is alarming. Head-load appears to be commercial. Illicit removal of bamboo is also very common and unchecked. In teak bearing areas illicit cutting of teak by local villagers as well as organised illicit cutting is also a subject to be focused on.

(xiii) Grazing pressure is tremendously high due to large cattle population. It is beyond the carrying capacity of the area. The total pressure is on Reserved Forests only as there is nothing in protected forests to (supply fodder to the cattle) share the burden of grazing.

Protected Forest have not been put under management so far and therefore, its condition has deteriorated to very alarming extent. The boundary has not been maintained and therefore, it is but natural to have difference between the area what it should have been and what it is.

Therefore, the first step towards management should be to demarcate it on priority basis by erecting RCC cairns of approved design.

(xiv) The state of boundary of Reserved Forests requires improvement. Outer boundary requires to be maintained by erecting RCC cairns of approved design.

5.2.15.2. PROTECTED FORESTS : In 1951, the proprietary rights were abolished and these areas vested in the state Government with effect from 1.4.1951. Initially, these areas were taken over by the Revenue department. Later on, the area in compact blocks, which were in excess of the village requirements were transferred to the forest department for management. In the year 1953, removal of forest produce except timber was permitted on rated passes to meet the bonafide needs of the people. Grazing was also permitted as per the M.P. Government Land Reforms Department No.956 – XXVIII, dated 4.12.1954. In the year 1954, Nistar officers were appointed to inquire into the nature of rights existing over forests and allot the areas vested in the Government for various village purposes. From 1954 to 1956 they carried out enquiries and prepared “Nistar patraks” for each village. Nistar Patrak is the record of rights of villagers over Government forests. In the Nistar Patraks Khasra numbers allotted for grazing of the cattle and for obtaining small timber, firewood etc. for nistar besides, other purposes, were shown. Wherever the forest area in a particular village was found to be in excess, the adjoining village with deficit forest was attached to it. Units formed by such arrangements were called grazing and nistar zones. The areas in-charge of the forest department was declared as Protected Forests under section 29 of IFA, 1927 in the year 1955. So far these area were not brought under systematic management. These areas were exclusively used for nistar purpose. People remained direct access to the forests which

resulted in heavy damage to the forests. The condition of the crop deteriorated to the greatest extent. At most of the places, bharati, khirni etc. are seen as the constituents of the crop. Most of the areas is open out of which some areas have been planted in the past. The present plan is the first attempt to include them for systematic management.

SECTION:5.3 : ANALYSIS OF PAST SYSTEMS OF MANAGEMENT AND CONCLUSIONS DRAWN :

5.3.1.1. The history of the past systems of mangement reveals that the forest areas (R.F.) of the tract dealt with were managed mainly under high forest or conversion working circle, two storeyed or coppice with reserve working circle and low forest working circle. The regular system of management was started by the British administrator on realising the fact that forest is one of the most potential renewable sources of revenue. This fact was brought to the notice of the British Administration by Major Lucie Smith who recommended the reservation of these forests. Accordingly these forests were reserved by the British Administration in the year 1879 and 1895 with the intention to use these renewable source of revenue exclusively by it to extract maximum revenue. With the prime objective to have maximum revenue from these renewable source, management plans were written and implemented. In the beginning only valuable marketable species in marketable sizes were harvested and fetched maximum revenue. Except harvesting for making money no other operations prescribed for improvement of the crop were attended to. On getting market for small sized timber of both teak and miscellaneous species the two working circles conversion or high forest and coppice with reserve or low forest working circles were formed. Teak, bija and semal were most sought species. Teak bearing areas and areas under miscellaneous crop but highly potential and suitable for conversion to teak forests were put together under uniform system with concentrated regeneration applying very simple theory that almost all the species of major importance are light demanders and the growth of forests in even aged stand is desirable. Since at that time revenue was the main consideration and hence there was no scope for other thought to be given in management. Consequently the main aim of the management was to convert maximum possible forest areas into a unifrom system consisting of a normal series of age classes in even aged stands with normal regeneration.

5.3.1.2. Most of the miscellaneous timber species were salable only as poles of 18 inches girth or thereabout and unsalable in large sizes. Bija, one of the most valuable species of the time was salable as logs of 4 feet girth and upwards and unsalable in small sizes. Under such a peculiar circumstances to observe the main consideration of the management in the mixed forest with a fair proportion of valuable species such as bija, a system of two storeyed forest with bija and other valuable species in the upper storey on long rotation and the other species as an under storey on a short rotation was coined and was named as coppice with standard / reserve system. The long term planning with this system was to analyse and arrive at the conclusion as to the upper or lower storey produces the best financial results. If the bija or upper storey gives the best results, conversion of the forest into a bija high forest was intended to be chosen and if the lower pole forests give the best financial results gradual removal of bija and management of low forests on a short rotation was intended to be chosen. Besides, low quality forests were managed to get small sized timber to meet the local demand so that there should not be any disturbances from local people in managing the forest as per its will. This is in short the story of silvicultural systems adopted in the past.

5.3.1.3. The ultimate aim of the management was recognised in past by many Working Plan Officers to attain normalcy in the forest which has been mentioned in almost all previous working plans. But it is very surprising that none could explain what is normalcy, what is structure of a normal forest and how can it be achieved. It was perhaps imagined the state of forest which could give sustained maximum return and it was only imagination and

remained dream. They all confined to normal forest with a normal series of age classes only i.e. even aged forests.

5.3.1.4. From the above it is clear that the main consideration of management was revenue earning and accordingly silvicultural systems as per site and type of forests were adopted. So far as coppice with reserve system in miscellaneous forest is concerned, silvicultural aspect of species was completely ignored while adopting this system. Without knowing the silvicultural character of species for producing coppice, coppice system was applied for all species. Due to this many important species as well as their host have diminished in occurrence which are poor or no coppicers or which coppice only upto a certain age. All the trees do not have the coppicing character and all those, which do have all character of coppicing do not exhibit the same vigour at all stages of their life cycle. It was observed by the working plan officers in the past as well that regeneration by coppice was not coming but the perception was different. The proportion of teak in the crop increased, as teak is good coppicer upto fairly longer period of its life cycle and so result was in conformity with the ultimate aim to convert entire area into teak and hence appeared encouraging. They simply did not bother for the other miscellaneous species which did not have market demand. Alongwith prescriptions for main felling other equally or more important prescriptions used to be enshrined in working plan. However, prescriptions for main felling were some how observed but others were mercilessly ignored. Regeneration, the main objective of felling, could not be evaluated during the operation of Khisti's Plan. The system applied should have been evaluated in terms of regeneration and accordingly decision should have been taken. We had such example when Vahid's Plan was discontinued on account of the failure of regeneration. But, unfortunately this could not be observed during operation of Khisti's Plan and all 15 coupes in all felling series of CWR under Khisti's Plan were worked but none of the stump could produce coppice, which was the expected source of regeneration for the future crop. It is the potential of the site that it is supporting some vegetation by way of natural regeneration.

5.3.1.5. Converting forests into teak forest by clear felling system as discussed above was the main consideration of the British to earn revenue to the maximum possible extent. At that time forests were viewed exclusively as the renewable source of revenue. Other dimensions of utility of forests were not even thought and forest is the base for living being was not even imagined. Since management was one point programme and so the system could not be evaluated in a right perspective. With the inception of the system, the mode of regeneration was adopted from natural seedlings as there was no problem in natural regeneration and its establishment. Gradually banking upon plantation to supplement the natural regeneration to some extent, was started and finally clear felling and planting had to be adopted due to poor response of natural regeneration. This was enough indication of the nature that the system needed correction. In fact nature always favours mixture due to the fact that an isolated community of a plant species cannot be stable. The theory of stability lies on interdependence and mobility. In a mixed crop, one species supports the other directly or indirectly. Some plants act as insecticides, such as leaves of garari are grab killer, some attracts birds which are responsible for seed dispersal and treatment of seeds of some species; some small plants are bad smelling which act as repellent to herbivores and thereby protect seedling around them from browsing; big trees provide shades to such small plants to survive, there are many medicinal plants on which wild animals and people residing inside forest depend for treatment and so on. Thus there is a well disciplined family structure in plant kingdom as well. The mono-culture cannot provide this. Besides, plants take nutrients from soil for their growth. The rate of taking nutrient is fast in very early stage, very fast thereafter till the rate of growth is increasing, slower after the rate of growth starts decreasing

and very nominal when growth almost culminates. The plant pays back to soil by way of providing leaf litters, aeration, nitrogen fixation etc. However give and take remains adverse in early stage of life and favourable at the fag end of life. In a natural condition, give and take remains balanced and the site quality remains protected. On the contrary, even aged crop drains maximum nutrition from the soil and contributes least as it is felled before the age after which it pays back to the soil. Besides, what so ever is paid back to the soil can not be balanced as the constituents of leaf litters of all the species are not the same as that of a single species and ability to provide other benefits to the soil is also different. All the ingredients of soil nutrition cannot be supplemented by a single species. This is mixture of so many ingredients, which are provided by different species. Thus, apart from the new policy of the management the clear felling system tends to deteriorate the site quality instead of enhancing and maintaining it. So far as revenue is concerned, miscellaneous forest is much more potential to yield revenue as it provides suitable environs to so many medicinal plants, the discovery of any one may fetch a number of times more revenue than that is fetched by teak. In future some plants may be understood the only source of life saving drugs which can not have substitute but teak can have always alternative.

5.3.1.6. Nature is the best manager and we should not do any act which oppose the nature. We should always try to provide the system as close as possible to the natural process for having perpetual stability. The philosophy of management lies in having healthy state of forest in perpetuity.

5.3.1.7. The most admiring prescriptions given in the British period was that the harvestable girths were decided by site quality but only for teak. That prescription remained confined to teak only. But unfortunately instead of integrating that prescription for all other species as well, that was forgotten even for teak too by the successors.

5.3.1.8. The principle of management is that interest is to be taken out keeping capital intact is not seen to have been observed. In fact no effort was made to define and quantify the capital, on which interest were to be taken. Therefore, due to lack of this knowledge, quantity which is being taken out is really the interest or interest with a part of principal or not even the total interest can not be told. What we have done so far is not done knowingly and in justified way.

5.3.1.9. Protected Forests were not covered under systematic management in the past and therefore, could not be supervised properly. Boundary marks were not maintained, which resulted encroachment. Indiscriminate grazing led to the deterioration of the forest to the greatest extent. Most of Protected Forests are either open or occupied by Khirni trees.

5.3.1.10. The concentration of wild animals, both carnivores and herbivores, is very good within the tract dealt with. In Khisti's plan a separate wildlife working circle was formed. The most sad part of it is that one of the objectives was to manage it for sustained source of sports and to earn revenue to the maximum possible extent. Other prescriptions given appear not be adhered to. At least development and improvement of basic amenities should have been done for wild animals, which had not been done.

5.3.1.11. The tribals are the part and parcel of the forest. Therefore, the management of the forest should be oriented in such a way that it could include the welfare of the tribal people as well. The prescriptions intended to solve their problem of "Roti", Kapda aur Makan" (Bread, clothes and shelter) should also be thought of. Solving these problems have two fold benefits firstly, welfare of the poor people and secondly, ensured protection of forests through their co-operations.

5.3.1.12. Forest fire is one of the important problems. Forest burns more than once in fire season every year. Though, mostly it is ground fire yet has detrimental effect on natural

regeneration and its establishment of almost all species. Besides, it burns the source of humus, the plant nutrient. The genesis of causes of fire could be analysed and listed but could not be stressed to be implemented. Research and analysis help in planning. Planning without execution is meaningless. By merely prescribing coupes to be protected from fire for some period without giving method of protection is not the remedy.

5.3.1.13. Grazing is also an equally important problem of the forest. Over grazing destroys every thing. To solve this problem, the origin of it will have to be searched and accordingly eradication measures will have to be oriented to hit the origin, only then this can be solved. Merely prescribing closure to grazing for a specified period can not solve the problem. In fact such prescriptions are neither followed nor practical. So long as population explosion is not checked and translation into practice of the concept of stall feeding is not practiced, this problem is beyond control.

5.3.1.14. Head loaders are another dimension of the forest problem. It has taken the shape of a profession. Some are bound to do it for their livelihood and some are practicing it as business. This is taking such a shape that if it is not tackled properly it will go beyond control. It is fact that there is tremendous pressure on forest for firewood and this cannot be met separately by Division. Fortunately, the production of firewood in this region is fairly good. The solution to the problem is easy if tackled at circle level and revenue coming from it is sacrificed.

PAST SYSTEM OF WIRUR, RAJURA & WANSADI FOREST RANGES OF CENTRAL CHANDA FOREST DIVISION, CHANDRAPUR:

SECTION :5.4 : GENERAL HISTORY OF THE FORESTS :

5.4.1.1. The tract dealt with present day Forest Ranges namely Rajura, Wansadi and Wirur was under the reign of then Hyderabad State of Nizam. It was brought under Hyderabad State after independence. After reorganisation of States it was transferred to erstwhile Bombay State and consequently to Maharashtra after creation of Maharashtra State in 1960. Earlier this area was in Nanded District of Marathwada and later on transferred to Chandrapur District of Maharashtra.

5.4.1.2. Unfortunately no records are available to show the original extent of the forests in the tract dealt with. But it is certain that with the increase in population, to satisfy land hunger, more and more areas from the forests were brought under cultivation. The practice continued till the preparation of previous working plan in early nineties of 20th century.

5.4.1.3. Prior to 1882, the forests were controlled by Revenue department. They had introduced a permit system. Permit holders were allowed to cut the trees for their bonafied use. Special staff was not provided to conserve the forests. The control was nominal.

5.4.1.4. In 1882 the Forest Department was constituted and forests were placed under the control of the department. Even then up to 1921 the felling were very unsystematic and consisted in removal of valuable species such as teak and bija by permit holders.

5.4.1.5. From 1921 onwards however, fellings under improvised schemes were started. The systems adopted were mainly Coppice with Standard and Selection-cum-improvement felling systems. But the details of the areas worked are nowhere available.

5.4.2. WORKING PLAN OF S.M. RAZVI

5.4.2.1. A working plan was prepared in 1931 by S.M. Razvi but without any stockmapping. In his plan he allotted the forests of Rajura and Chicholi blocks to “Intensively Workable” felling series with 40 years rotation. The forests of Manickgarh and Garlapeth blocks were included in “Experimentally Workable” felling series, while Siddheshwar block was included in ‘Scrub’ felling series for fuel supply with 30 years rotation.

5.4.2.2. Coppice-with-Reserves system was prescribed by him for all the felling series. For understocked areas, the number of ‘reserves’ to be retained depended upon the density. Only dead, dying and seriously diseased trees were to be removed from the understocked areas. No trees were to be cut on the head of the ravines or on the edges of cliffs for fear of erosion. On the contrary, in wellstocked areas where the proportion of teak or any one principle species was excessive, no reserves were to be retained.

5.4.2.3. RESULTS : The sequence of fellings is nowhere traceable. However, there are some sketches which give the idea about the areas worked. In Rajura block the areas have been worked at several places along the external boundary, while in Chicholi block north-eastern and southern portions have been worked.

5.4.2.4. In the mixed miscellaneous forests occurring in major portion in Rajura block, mature and over mature trees of valuable miscellaneous species such as bija, bhirra, dhawda, etc., had failed to produce coppice shoots and the reproduction mainly consisting of inferior miscellaneous species mentioned above was plentiful in patches.

5.4.2.5. In both the blocks, reservation of trees in the areas worked was almost negligible. The erosion was conspicuously seen in the worked areas, which were in the vicinity of nalas as sufficiently wide strip on the heads of ravines was not excluded from felling. Thus it was evident that the working of these forests was not on sound lines due to defective prescriptions.

5.4.2.6. In Siddheshwar block small portion of the forests in the north-eastern and western regions had been worked. In Manickgarh block also, negligible areas had been felled in compartment Nos. 15 and 42. The working appears to have been abandoned perhaps due to interior tract being difficult to negotiate and inferior tree-growth containing more of salai.

5.4.3.WORKING PLAN OF S.G.BHOGALE:1945-46 to 1954-55 extended to1966-67

5.4.3.1. That was the first working plan prepared in a systematic manner after stockmapping the forests into quality classes. No statistics of growth and yield except for salai were collected during the preparation of that working plan and the allotment of areas for working under different silvicultural systems was done on the strength of quality classes, accessibility of the forests, and after determining the local needs as regards to timber, fuel, grazing and local industries. The working plan was prepared for a period of 10 years i.e. 1946-55. It was not taken up for revision in 1956 and was under implementation upto 1966-67. The prescriptions under the various systems of management and the results of the working are summarised below :

5.4.3.2.Coppice with Reserves Working Circle: Almost all the accessible forests in the tract dealt with were allotted to Coppice with Reserves working circle as they were found to be of poor quality and capable of producing poles, small timber and fuel. But it was felt that the quality of the forests was little under estimated during the previous stock-mapping. The total available area of 17287.37 ha was divided into 13 felling series for working under Coppice with Reserve system with a rotation of 40 years and a mid-rotational thinning at 20 years. Out of 13 felling series, 4 felling series were provisional.

5.4.2.3. The special objects of management were as follows :

- (a) Management of the accessible forest of poor quality which were capable of producing poles, small timber and fuel to meet the local demand of small timber and fuel.
- (b) To improve the condition of the crop by retaining the well-grown trees of valuable species like teak, ain, shisham, haldu and bija for production of large-sized timber and to secure the continued existence of these species.
- (c) To maintain a continuous crop cover, to prevent erosion and to maintain sub-soil water.
- (d) To increase the proportion of teak by way of retention wherever it was scarce.

5.4.2.4. As per prescriptions the understocked areas amounting to blanks, precipitous slopes liable to erosion and the trees on the fringes of the streams and nalas containing pools of water in dry season were to be excluded from fellings.

5.4.2.5. Following marking rules were prescribed for reservation :

- (a) All semal trees to be reserved over the whole area.
- (b) Salai and moyen trees from Siddheshwar, Garlapeth and Manickgarh blocks were to be reserved.
- (c) 75 reserves per ha of teak, ain, shsisham, haldu and bija preferably between 37.50 cm and 60 cm girth-limit was considered to be minimum necessary where the reproduction by seedlings and coppice origin was likely to be sufficient, to stock the area adequately. Where the reproduction by seedlings or coppice was likely to be insufficient, the best available poles of all valuable species were to be retained. In absence of these trees of any species and of any size were to be reserved.
- (d) Trees of any size or shape were to be retained in blanks excluded from fellings to protect the soil.

5.4.2.6. Bamboos, interfering with the reproduction of valuable species, were to be felled preferably in advance of main fellings, failing which they were to be felled along with the subsidiary operations.

5.4.2.7. The following subsidiary operations were prescribed:

- (i) All unreserved trees left unfelled by the contractor were to be felled departmentally, if their removal was necessary for silvicultural reasons.

- (ii) All malformed and unpromising reproduction of the valuable species, which was not cut by the contractor, was to be cut back.
- (iii) Reserved trees broken during the fellings were to be cut back.
- (iv) All remaining climbers were to be cut.

5.4.2.8. RESULTS : The tree-growth in Rajura block, except teak areas in southern portion, comprised mainly of mature and overmature trees of miscellaneous species such as bhirra, dhawada, tendu, lendia, bija, ain, etc., along with scattered teak. Hence mature trees had been retained for the sake of reservation. Majority of the worked areas contained mature and overmature trees which had failed to produce coppice shoots. Hence coppice reproduction was poor. A good number of trees below the prescribed girth limit of 60 cm had been removed at the time of felling. Hence the number of reservation was far below the prescribed minimum of 75 trees per ha and the worked areas look open. In such open patches the reproduction of inferior species such as ghoti, kuda, papda had formed thickets along with climbers like kukuranji, chilati etc. At places tarota had formed thick matting, the spreading root system of which had made the ground impenetrable.

5.4.2.9. In teak areas occurring in southern portion of Rajura block and Chicholi block, the teak reproduction of natural and coppice origin had come up well and quite satisfactorily. But mature and over mature trees of bhirra, bija, ain and dhawada had failed to produce coppice shoots. The trees below 60 cm girth have been felled which had brought down the number of reservations below the prescribed minimum of 75 trees per hectare. Hence the area looks open in patches. In such areas species such as ghoti, kuda, papda, bharati etc. had formed thickets thereby inhibiting the regeneration.

5.4.2.10. On the whole, it can be said that teak areas contain fairly good regeneration due to strong coppicing power of teak but miscellaneous areas were lacking in reproduction of valuable species.

5.4.2.11. The tree-growth in Siddheshwar and Garlapeth blocks contained less of valuable species such as teak, bhirra, bija, ain, dhawada, etc., and more of salai in overwood. The areas being hilly and crop containing more of inferior species, some areas had not been worked. The worked area from these two blocks contained the reproduction of the same inferior miscellaneous species mentioned above.

5.4.2.12. Further, subsidiary cultural operations had not been carried out, which had resulted into poor quality and inferior crop at places.

5.4.2.13. Anduk (Boswellia serrata) overlapping working circle : This working circle was constituted with the sole object of meeting the demands of anduk (*Boswellia serrata*) and gumpana (*Lannea grandis*) required by the Sirpur Paper Mills Ltd., for the manufacture of mechanical wood pulp and wood free paper.

5.4.2.14. For that purpose, the Nizam Government in the year 1947 conferred upon the Sirpur Paper Mills Limited the sole and exclusive rights of harvesting of salai, borgu and tapsi in Adilabad District in the first instance for a period of 30 years by extending the licence and lease granting the sole rights of harvesting the bamboo areas. According to that agreement, the company was to pay to the Government, during the currency of the contract period, a royalty at a basic rate of six pies per cubic foot of anduk, borgu and tapsi and other varieties of soft-wood so long as the net earnings of company over its total investment on the mechanical wood pulp and paper section were not more than four per cent and that for every one per cent increase in the net earnings of the said sections of the company above that said minimum of four per cent, the royalty was to be increased by one pie above the said basic rate of six pies per cubic foot up to ten per cent. When the earnings were to rise above ten per cent the company was to pay for every one per cent increase in said net earnings above ten per cent an additional royalty of two pies per cubic foot and the aforesaid royalty was to be made applicable only to mechanical pulp and paper industry and was not to affect the

royalty in respect of chemical pulp industry. The above rate of royalty was applicable for a minimum period of twenty-five years.

5.4.2.15. From the tract dealt with only the blocks, namely Siddheshwar, Garlapeth and Manickgarh, were included in that working circle as against the total nine blocks. Out of those three block, compartment-wise order of fellings was given only in case of Garlapeth block for a period of 5 years and not the year-wise sequence of working. In case of Siddheshwar and Manickgarh blocks neither the compartment-wise order of fellings was given nor the sequence of working.

5.4.2.16. Coppice reproduction of salai is not dependable as it either dies or is blown down by strong winds. Hence Coppice with Reserve system was not suitable. Similarly younger age classes were practically absent. Hence it was not possible to work those forests under high forest system. Thus the only possible system of improvement fellings was followed for working those forests, with an arbitrary rotation of 40 years and a felling cycle of 20 years.

5.4.2.17. For the sake of calculating the annual yield, strip enumeration of growing stock was carried out, in 30cm Girth classes, over 725.6 ha in Garlapeth block and 456.9 ha in Kadamba block; and in addition to that, ten sample trees of each girth class were also felled and then cubical contents were found by actual measurements. Based on these it was found that the standing volume per hectare was nearly 8.49 m³ in Garlapeth block and 4.45m³ in Kadamba block. Taking these two blocks as a criterion, the standing volume per ha for the remaining blocks was estimated on general observations. From these figures total growing stock of salai in the nine blocks allotted to that working circle was estimated at 42,47,400m³. The annual yield of 1,06,185m³ was worked out for the rotation of 40 years. During the felling cycle period of 20 years entire areas was to be gone over in which it was assumed that half the standing volume would be harvested wherein also the annual yield worked out to 1,06,185 m³.

5.4.2.18. The compartment was adopted as a unit for marking and harvesting. The following marking rules were laid down for the guidance of the marking officer.

(a) The sufficient number of salai trees below 90 cm Girth and gumpana trees below 75 cm were to be retained to form part of the future crop.

(b) Where trees occur in groups and patches, only seed bearers were to be retained at suitable distance and evenly distributed over the area. Seed bearers were to be retained invariably in blanks and understocked areas.

(c) No trees were to be marked in places where serious erosion is in progress unless there were trees of other species to protect the soil.

(d) All dead, dying and unsound trees were to be marked for felling. But sound trees capable of producing seeds were to be retained as seed bearers.

(e) Half the number of standing trees were to be felled unless anduk and gumpana were scarce in a compartment.

5.4.2.19. In subsidiary cultural operations, sowings and planting of anduk and gumpana were prescribed, so far as the available staff and funds permit, as the natural regeneration of both these species was not expected. Planting of cutting and sowing of seeds in one-foot contour strips worked to a depth of 15cm and 3.6 m apart and also in pits of 30cm x 30cm x 30cm and 3.6m apart were to be carried out.

5.2.4.20. RESULT : Both the species namely salai and gumpana have never been harvested so far from the tract dealt with.

5.4.2.20. Bamboo Overlapping Working Circle : This working circle included all the compartments containing harvestable bamboos in workable quantities. According to the licence and lease granted by the then H.E.N. the Nizam's Government in the year 1936, the Sirpur Paper Mills Ltd. Was conferred upon the monopoly and the sole rights of harvesting the bamboo areas, for manufacture of paper and pulp, in the then Adilabad District, for a

period of 30 years in the first instance from the date of actual commencement of the regular normal working of the factory and the licence and lease have been renewable for further period of like durations of such terms as may be decided upon at the expiry of the period. The rate of Royalty was fixed at Rs. 3.00 per tonne as weighed on the company's weigh bridge. The department was not authorised to sale the bamboos to any other party, for any purpose, except for the bonafide requirements of the residents of the locality. In which case, the Range Forest Officer was to issue a special permit, the copy of which was to be given to the company. The lease expires in 1969.

5.4.2.21. The felling cycle of 4 years was adopted and the yield was controlled by area. The following rules were laid down for the bamboo harvesting:

- (i) No culms under one year of age were to be cut.
- (ii) All culms, were to be cut at a height of 15cm to 30 cm above the ground level. In congested clumps, culms could be cut at 45 cm from ground level.
- (iii) A minimum of six culms over one year of age were to be retained in each clump.
- (iv) As far as possible, no dead bamboos were to be left in any harvested clump.
- (v) Digging or extraction of rhizomes was not permitted.

5.4.2.22. RESULTS : The bamboos flowered in the year 1943-44. As a result no programme for bamboo working from any of the blocks dealt with was given by S.G.BHOGLE in his working plan period. However it is revealed that Sirpur Paper Mills Ltd. Extracted bamboos from Garlapeth and Manickgarh blocks as shown in the following statement:

Name of block	Extraction of bamboos (in tonnes)			
	1953-54	1954-55	1955-56	1956-57
Manickgarh	2,165	2,675	1,484	3,936*
Garlapeth		2,260	1,067	121*

NOTE : The extraction figures marked with * are from the forest tract transferred to erstwhile Bombay State after State Reorganisation.

5.4.2.23. After 1957 the Paper Mills could not extract the bamboo as the areas were not handed over to them. The Paper Mills represented in February 1962 to hand over the forest in Rajura Tahsil, transfer to the then Bombay State, to which Government in Revenue and Forest Department released Garlapeth block at the first instance in March 1962 and Manickgarh, Chicholi and Siddheshwar blocks in December 1962. For the purpose of extraction, seven provisional bamboo felling series were formed in December 1963. The Paper Mills started the extraction of bamboo from 1963-64 onwards. The following statement gives the felling series-wise extraction of bamboo by Sirpur Paper Mills Ltd.:

Coupe-wise and felling series-wise yield of bamboos (in metric tonnes)

Year of	No. of coupe worked	Garlapeth block PBF.S.	Siddheshwar block		Manickgarh block			
			PBF.S. I	PBF.S. II	PBF.S. I	PBF.S. II	PBF.S. III	PBF.S. IV
1	2	3	4	5	6	7	8	9
1963-64	'A'	--	--	--	545.40	--	261.25	2,774.15
1964-65	'B'	544.70	848.01	--	176.06	145.35	2,075.00	62.23

5.4.2.24. Plantation Overlapping Working Circle : This working circle was constituted for planting the suitable sites with valuable species such as teak, semal, bija, shisham and ain. Preference was to be given for semal. For this purpose an area of 40 ha from Compartment No. 155 (old Compartment No. 449) of Rajura block was to be planted.

5.4.2.25. RESULTS : No Plantation was carried out in Compartment No. 155 (old Compartment No. 449) during the plan period according to Bhogle's Working Plan.

5.4.2.26. Miscellaneous Working Circle : The compartments, not allotted to coppice with reserves working circle, were included in this working circle. This working circle covered almost the whole of Manickgarh block excepting a small fringe on northern side included in Lakkadkot and Isapur Coppice with Reserve Working Circle. It also included other smaller blocks like Somthana, Mangalhira, Pardi, Talodhi, Ahson, Kanergaon and northern portion of Siddheshwar block. The forest allotted to this working circle contains less valuable tree growth containing more of salai and are situated in the interior and hence not brought under working under any silvicultural system of management. No definite prescriptions were laid down for the management of these areas. But the Divisional Forest Officer was authorised to carry out the irregular harvesting without reference to the Conservator for the sake of departmental purposes. The fellings under this were permitted strictly in conformity with the silvicultural principles. He was also authorised for harvesting and disposal of the produce along boundaries, road alignments, clearing for buildings, tanks and camp grounds.

5.4.2.27. RESULTS : No irregular harvesting was done during the plan period according to Bhogle's working plan.

5.4.2.28. Harvesting outside the working plan : The accessible areas bearing teak and miscellaneous crop not included for regular working in Bhogle's plan have been worked presumably under improvement fellings from 1954-55 to 1965-66. The correspondence regarding the formation of felling series, allotment of compartments and annual sequence of fellings is not available anywhere. Similarly the silvicultural system followed and the marking rules are also not traceable. However the traces showing the sequence of annual coupes and their situation is available. In all, four felling series were formed for working the forests of Manickgarh, Pardi and Mangalhira blocks under the improvement fellings, the details of which are as below :

Sr.No.	Name of the Felling Series	Name of block	Total No. of annual coupes	Total area in ha	No. of coupes worked	Total area worked in ha
1	2	3	4	5	6	7
1	Wansadi	Manickgarh	I to XIV	648.711	I to XIII	591.246
2	Ergaon	Manickgarh	I to XIII	639.403	I to XII	563.727
3	Mangalhira	Manickgarh	I to X	565.346	I to X	365.346
4	Pardi	Pardi	I to X	350.053	I to X	350.053

5.4.2.29. RESULTS : The density of the crop from these area is already low and hence the working amounted to removal of trees cautiously. The natural reproduction is sparse but the coppice regeneration is plentiful. Cleanings are essential to benefit the young coppice crop.

5.4.2.30. Harvesting of Khair : The then Government of Hyderabad, in August, 1956, leased out sundra (khair) trees at the flat-rate of Rs. 1.50 per tree, from the forest areas falling within the Revenue District Adilabad to Shri. Laljee Muljee a resident of Hyderabad, for manufacturing katha for a period of 10 years intervening 1st July 1956 to 30th June 1965. For this purpose Khair trees marked every year in annual coupes by the forest Department were to be harvested by the contractor. The minimum girth limit for harvesting was kept at 45 cm at breast height. There was no commitment about the number of trees but the available number of trees under scientific management were to be marked. Thus contractor had no right to claim more trees than those marked in the annual coupe. The contractor was liable to pay the full amount for the total number of trees marked in the coupe whether he utilises them or not. The tract dealt with was transferred to the erstwhile Bombay State on 1st November 1956 at the time of Reorganisation of States. The contractor made a petition in 1960 requesting that he might be allowed to work the khair trees in Rajura Taluka transferred to the then Bombay State. The contractor was permitted to work as per the contract in March

1962. Accordingly, the khair trees were marked only in annual coupes. However the contractor did not harvest them but requested the Government to extend the lease period by 5 years. His request was turned down by Government in view of the opinion offered by the Law and Judiciary Department according to which the contractor was not legally entitled to extension. The contractor also made another request on 27th November 1962 to permit him to cover the entire area within 3 years, as only three years period had remained according to the agreement deed. This request was also turned down as firstly it was in contravention of agreement terms and secondly khair trees were to be marked in annual coupes in accordance to silvicultural principles. Thus so far the contractor had not harvested khair trees and the lease period of 10 years expired on 30th June 1965.

5.4.3. THIRD WORKING PLAN OF S.B.KULKARNI (1967-68 to 1981-82 extended upto 1986-87):

5.4.3.1. It was prepared by S.B. Kulkarni after complete stock-mapping of the compartments. The period of the plan was from 1967-68 to 1981-82. The same was further extended up to 1986-87. The following data was compiled during the preparation of this plan.

(a)Rate of growth of teak was ascertained by stem analysis of 8 teak trees and stump analysis of 56 teak stumps.

(b)Local volume tables were prepared for teak, bija, bhirra and dhawada from the log outturn data.

© Tree enumerations were under taken in important forest blocks like Rajura, Chicholi, Garlapeth, Siddheshwar and Manickgarh to find out the nature and composition of the growing stock and the state of natural regeneration.

(d)One percent bamboo sample survey was carried out in the commercial bamboo felling series to arrive at the bamboo potential.

5.4.3.2. General objects of management : Those were:

(i)To combat the ill-effects of soil erosion and to preserve and promote soil cover on the steep and precipitous slopes.

(ii)To satisfy the local as well as out side demand of timber, firewood and charcoal to the extent the forests can bear.

(iii)To enhance the value of the forests by increasing the proportion of valuable species such as teak, bija and khair and also of the industrially important species such as eucalyptus, semal and maharukh by the preferential treatment and by plantations.

(iv)To satisfy the demand of timber, bamboos and other forest produce required by various industries.

(v)To convert the degraded forests into pasture to supplement the increasing grazing needs.

(vi)To regulate grazing on the basis of incidence and to distribute the cattle as evenly as possible both in the interest of silviculture and of the cattle themselves.

(vii)To obtain progressively increasing yield of all kinds of forest produce.

(viii)To aim at the creation of normal forests with all that it implies.

5.4.3.3. On the basis of the stock mapping details and growth data collected, the following working circles were constituted in accordance with the general objects of management:

(i)Conversion Working Circle : 9869.850 ha.

(ii)Miscellaneous Plantation Working Circle : 3182.490 ha.

(iii)Selection cum-improvement Working Circle : 44186.715 ha.

(iv)Coppice with Reserve Working Circle : 2797.335 ha.

(v)Pasture Working Circle : 1506.600 ha.

(vi)Bamboo (Overlapping) Working Circle : 60683.065 ha.

(vii)Khair (Overlapping) Working Circle : 30952.125 ha.

5.4.3.4. The principle prescriptions under various working circles were as follows.

5.4.3.5. CONVERSION WORKING CIRCLE : In this working circle all India site quality IV and above area having gentle slope were included. Clearfelling system with artificial

regeneration of teak and khair along with the retention of natural regeneration in groups were prescribed. Rotation was fixed at 60 years. It was divided into 3 periods of 20 years each. PB I was definitely allotted whereas PB II and PB III were grouped together and PB unallotted was formed.

5.4.3.6.FELLING SERIES : There were three felling series i.e Rajura, Khambada and Chicholi and in the fourth namely Dhanakdevi, the plantation programme for only 20 years was given. Yield was to be controlled by area. Felling rules were as follows :

5.4.3.7. PERIODIC BLOCK I: Areas liable to erosion, blanks and under-stocked areas with density below 0.4 and one chain wide strips along nala banks and slopes above 30° were to be excluded from working . Groups of poles and natural regeneration were to be retained as part of the future crop. Rest of the area was to be clearfelled and suitable sites were to be planted with teak stumps at 2m x 2m. Khair seeds were to be sown in other sites, which are unsuitable for teak, in lines 2m apart.

5.4.3.8. PERIODIC BLOCK UNALLOTTED : Only dead, dying and diseased trees were to be removed. However, cleanings and thinnings were to be carried out to remove congestion and improve the condition of coppice regeneration in the areas worked under the Coppice with Reserve system. In addition to above, subsidiary cultural operations like cutting back operation in the following year of main fellings, cleanings in the 6th year of plantation and in plantation area, thinnings in 7th, 13th, 25th and 41st year of planting were also prescribed. 7th year thinning was to be mechanical whereas 13th year and 25th year thinning were prescribed according to the formula.

$$D = 3(d+3)/2$$

Where: “D” is distance between two trees in feet and

“d” is crop diameter (Overbark) at breast height in inches.

41st year thinning was to be light crown thinning to favour dominant trees.

5.4.3.9. RESULTS:

As per the prescriptions, teak plantations have been carried out from the year 1969. The plantations raised during the plan period are given in table below.

Name of the Felling series	Total area in ha under PBI.	Total plantable area in ha	Actually planted area in ha upto 1985-86
1. Rajura	1003.185	905.175	703.300
2. Khambada	1066.770	970.785	644.200
3. Chicholi	752.400	712.980	550.320
4. Dhanakdevi	955.800	708.345	Nil
Total	3778.245	3297.285	1897.820

(ii)No plantations were taken in Dhanakdevi Felling series due to the problem of mass encroachments.

(iii)During the revision of that plan enumerations were carried out in the above plantations. Statistics of growth showed that the said plantations belonged to teak site quality IV and were maintained properly.

(iv)Khair seeds were not sown as per prescriptions.

(v)Cleanings and thinnings were not carried out scrupulously.

(vi)Soil and water conservation measures were not taken up.

(vii)Treatment maps were not prepared properly and as a result in unworkable areas also clearfelling was done.

(viii)In periodic block unallotted, apart from prescribed removal of dying and diseased trees, healthy, matured as well as immature trees were also felled, resulting in the over harvesting.

5.4.3.10. Due to the reasons mentioned above the status of the forests in PB Unallotted was degraded to a large extent, large areas had become understocked and erosion was accelerated. The following figures give the picture clear.

Name of the felling series	Area included in PB Unallotted	Area under stocked (in ha)	Area where surface soil is lost and gullies are formed (in ha)
1. Rajura	2254.230	597.046	298.523

2. Khambada	2340.090	329.676	414.838
3. Chicholi	1620.000	380.614	190.307
Total :	6214.320	1807.366	903.668

5.4.3.11. MISCELLANEOUS PLANTATION WORKING CIRCLE : Forests, mainly belonging to IV and III site quality from the eastern and western sides of Rajura and Somthana blocks were included in this working circle. Clearfelling system for raising artificial plantations of eucalyptus, semal, maharukh etc. was prescribed. The area was divided into two felling series i.e. Somthana and Vihirgaon. Twenty year rotation was prescribed for eucalyptus.

5.4.3.12. Felling rules were prescribed as follows : (i) Eroded areas, barren or understocked areas, nala banks and slopes above 30° were to be excluded from working. (ii) In other areas, eucalyptus seedlings at 1.5m x 1.5m spacing supplemented by stumps planting of semal, maharukh etc. to be planted after clearfelling. (iii) In degraded areas, khair seed was to be sown in lines 2m apart.

5.4.3.13. Subsidiary cultural operations like cutting back and cleanings were also to be carried out. However, thinning regime for eucalyptus was not prescribed. But an assessment was to be taken in the 10th year of plantation.

5.4.3.14. RESULTS : Deviating from the above prescriptions, from the year 1971 onwards, only teak plantations were taken regularly except in the year 1978, along with teak, semal and maharukh were also planted but it is seen that semal plantation is totally failure whereas maharukh and teak are successful to some extent.

Details of the area planted

Name of the Felling series in ha	Total area of the F.S.	Plantable area in ha	Area actually planted in ha (upto 1985-86)
1. Somthana	1988.450	1208.115	763.254
2. Vihirgaon	1283.040	929.880	573.917
Total :	3185.490	2137.995	1342.171

5.4.3.15. During the revision of that plan, growth data were collected. From the above data it is seen that the said plantations belong to IV quality. That shows that the original site quality is maintained. That is only due to the introduction of teak. Thus the decision to plant teak instead of eucalyptus as was prescribed in the working plan was proved to be correct. But since the subsidiary operations were not carried out as prescribed the growth of the plantations is not so as desired. Moreover since the treatment maps were not prepared properly, even in understocked and erosive areas clearfelling was done and as a result, in considerable areas the survival of the plants is below 50%. As a result understocked and barren patches are also not uncommon in the planted areas.

5.4.3.16. SELECTION-CUM-IMPROVEMENT WORKING CIRCLE : In this working circle, areas of III and IV site quality from Garlapeth, Siddheshwar and Manickgarh blocks were included. Selection cum Improvement felling system alongwith clearfelling in suitable patches for raising teak plantations was prescribed. To supplement the natural regeneration and coppice reproduction which was inadequate to restock the areas, five percent of the coupe area in all the felling series was to be planted with teak and khair.

5.4.3.17. Teak being the principal species and it was to be given preferential treatment along with other valuable species viz. Bija, bhirra, shisham, ain, tiwas, haldu and kalam

accordingly. Twenty years felling cycle was adopted. The area was divided in eight felling series and the yield was to be regulated by area.

5.4.3.18. Felling Rules were as follows : Area liable to erosion, blanks and understocked areas with density below 0.4 and one chain widestrrips along nala banks were to be excluded from working. Steep slopes above 30° were to be demarcated as protection belts. In the workable areas one out of two trees of teak, bija, bhirra, dhawada, ain, kalam, haldu and shisham above harvestable girth were to be removed if their retention was not necessary on account of silvicultural principle. Suitable sites (Five percent of the coupe area), not less than 0.8 ha at a stretch was to be clearfelled for raising plantations of teak and khair.

5.4.3.19. Selection girth of harvesting were fixed as follows :

Sr.No.	Species	Selection girth for harvesting in cm
1	Teak (<i>Tectona grandis</i>)	90
2	Shisham (<i>Delbergia latifolia</i>)	
3	Bhirra (<i>Chloroxylon swietenia</i>)	
4	Salai (<i>Boswellia serrata</i>) or Anduk	105
5	Bija (<i>Pterocarpus marsupium</i>)	
6	Ain (<i>Terminalia alata</i>)	
7	Halud(<i>Adina cardifolia</i>)	
8	Garari (<i>Cleistanthus collinus</i>)	45

5.4.3.20. Subsidiary silvicultural operations like cutting back, cleanings (in the 6th year) and thnnings (as in Conversion Working Circle) in the plantations were also prescirmed.

5.4.3.21. Results : The areas of the six felling series from the Manickgarh block was 35,847.36 ha (i.e. 81.13%). Out of this only 1460.91 hectare (i.e. 4.07%) was worked during the next 19 years. Most of the area could not be worked either due to steep slopes or due to encroachments. Following table shows the areas worked and the average yield obtained.

Name of the felling series	Total area of the F.S. (in ha)	Actual area worked (in ha)	Numbe r of trees cut per ha	Average yield per ha in cubic metre		Total yield in cubic metre	
				Timber	Fire wood	Timber	Firewood
1. Garlapeth	3613.815	3290.00	13.14	1.77	8.43	5823.30	27,735.00
2S`shwar	4725.540	3167.00	35.51	0.89	12.42	2081.63	39,366.00
3. Punaguda	6261.300	Nil		N.work			
4. Palezari	6891.480	339.355	00.38	--	1.08	--	258.00
5. Kakband	5536.350	653.780	1.54	0.11	9.20	72.740	6,020.00
6. Khadki	6483.240	467.775	11.64	0.05	2.32	24.647	1089.00
7. Kodhapur	6117.930	Nil		N.work			
8. Tangara	4557.060	Nil		N.work			
Total	44186.715	7817.910	20.75	1.11		8739.317	74468.00

5.4.3.22. (i)From the above figures it is seen that only 17.69% area was worked.

(ii)As per the prescriptions, in each coupe of every felling series, 5% area was to be planted with teak, ain, khair. But it was not done.

(iii)Felling rules were not followed scrupulously.

(iv)Subsidiary cultural operations were not carried out.

(v)As a result of negligence of the working plan precriptions, instead of improvement in the growing stock, it had deteriorated and due to encroachments an area of about 25,008.661 ha has gone under cultivation and tree cover is lost forever.

5.4.3.23. Following table gives the idea about depletion in growing stock during the period of 17 years i.e. from 1966-67 to 1983-84.

Name of the block	Total number of trees above 15 cm Girth.	
	1966-67	1983-84
1. Garlapeth	413	235
2. Siddheshwar	501	157
3. Manickgarh	469	204

Thus it is very much clear that even the capital was not intact not to speak of the increment in growing stock.

5.4.3.24. COPPICE WITH RESERVE WORKING CIRCLE : In this working circle, forest of Mangalhira, Chanai-Barsa I and II and Pardi blocks were included. They were capable of producing small timber and fuel wood. The tree growth in general belonged to site quality III and IV. Mainly miscellaneous species like ain, bija, dhawada, shisham, tendu, mahuwa etc. were found along with teak. Garari was the principle species. Bamboos were found only along nala banks. Advance growth and reproduction of above species was adequate in patches. Rotation was kept at 40 years. Two felling series were formed and yield was regulated by area.

5.4.3.25. Felling rules were as follows : (i) Eroded areas, areas liable to erosion, blanks, understocked areas and one chain wide strips along nala banks were to be excluded from felling. (ii) In patches of young pole crop thinnings were to be carried out. (iii) In poorly stocked areas, the number of reserve should have been 125 to 150 trees per hectare of any species. In other well stocked areas, trees of economic importance viz. Teak, bija, ain, bhirra, shisam, haldu, dhawada and tinsa were to be reserved to the extent of 40 trees per ha. also all healthy trees of above species upto 45 cm girth were to be retained. Subsidiary silvicultural operations viz. Cutting back operation, cleaning and thinnings were prescribed. Only one thinning at the mid rotation age (20 years) was prescribed.

5.4.3.26. Results : Most of the coupes remained unworked either due to encroachments in them or were unworkable as they were understocked since mature trees were removed in the worked areas. Coppice regeneration could not be obtained to the desired extent except for garari and lendia, that too in patches only. As a result growing stock got depleted. Due to heavy uncontrolled grazing and rocky, shallow soil and hard pan of slate at a depth of about 30 to 45 cm Natural regeneration was conspicuously absent and the growing stock was depleting day by day. Wherever some good soil occurred, it had gone under encroachments. Balance area needed urgent soil and moisture conservation measures along with afforestation. Following table shows the extent of encroachments and understocked areas.

Forest block	Total area in ha	Area under cultivation or encroachment (in ha)	Extent of understocked area (ocular estimate)	Balance area having some growth
1. Mangalhira	1735.020	427.500	134.354	1173.166
2. Chanai Barsa I	724.545	176.810	38.913	508.822
3. Chanai Barsa II	92.340	56.314	--	36.026
4. Pardi	350.325	48.600	90.650	211.075
Total	2797.335	709.22	263.917	1824.194

5.4.3.27. This shows that 24.18% of the area was under cultivation or encroachment and 9% of the balance area was understocked. Following table shows the then growing stock per ha in the above areas.

Species	No. of trees per ha above 15 cm Girth
A) Ain, bija, lendia and teak	34.02
B) Behada, Khair, kalam and salai	11.49
C) Other misc. species	66.45
Total	111.96

Girth class wise percentage distribution of the above stock is as follows :

Girth in cm	15-30	30-45	45-60	60-75	75-90	90-105	105-120	120-135	Above 135
% of stock	31.73	18.82	13.62	10.67	6.87	5.02	4.57	3.69	5.01

5.4.3.28. BAMBOO (OVERLAPPING) WORKING CIRCLE : In this working circle 60,683.175ha area from Rajura, Chicholi, Garlapeth, Siddheshwar and Manickgarh blocks, distributed in 186 compartments were included. Fair stockings were seen in only following areas :

Range	Area in ha
Rajura	188.325 ha
Wansadi	4902.102 ha
Wirur	4125.785 ha
Total	9220.212 ha

And in other areas bamboo was sporadic and confined only along to nala banks in patches. The only variety that occurs is *Dendrocalamus strictus*. It had flowered gregariously in 1943-44. Three years felling cycle was adopted. Each felling series was divided in 3 coupes.

5.4.3.29. Felling rules were as follow :

- (i) Clumps having less than 8 culms were to be treated as understocked and were not to be harvested.
- (ii) During 15th June to 15th September felling was prohibited.
- (iii) Culms less than one year old were not to be felled.
- (iv) All dead, dying and malformed culms were to be cut.
- (v) A minimum of 8 green culms including current year culms, well distributed over the clump were to be retained.
- (vi) Culms were to be cut obliquely between 15 cms to 45 cms from the ground level.

The bamboos flowered gregariously from 1986 to 1988.

5.4.3.30. Effects : Since the control forms are not up-to-date, information regarding the bamboo harvesting and yield obtained is not available. However, it is learnt that only from Wirur Range, some of the coupes were worked to fulfil the local demand. Due to encroachments in Manickgarh block bamboo areas have decreased.

5.4.3.31. KHAIR (OVERLAPPING) WORKING CIRCLE : In this working circle 30,952.125 ha area containing fair proportion of khair were included. Main object was to meet the demand of katha industry. Prescriptions were as follows :

Felling cycle : 20 years.

Yield regulations : It was done by number of khair trees.

Selection girth for harvesting : It was kept at 60 cm Girth at b.h. from katha manufacturing point of view.

5.4.3.32. Results : Since the prescribed number of trees were not available for felling and also since there was no demand from katha industry the working circle became defunct.

5.4.3.33. PASTURE WORKING CIRCLE : This working circle contained the 1506.6 ha open forests of Kanhergaon, Ahson and Talodhi blocks which had ceased to yield even small timber but are conveniently situated for providing grazing facilities to cattle from surrounding villages. A simple form of rotational grazing of two coupes system were prescribed.

5.4.3.34. Results : Due to large increase in the cattle population prescriptions could not be implemented. At the same time, since no development works were prescribed, naturally the area was neglected. Even demarcation of the area was not maintained and it resulted in encroachments.

Name of block	Total gazetted in ha	Area under cultivation or encroachment in ha	Balance area in ha
1. Kanhergaon	418.770	418.770	0.000
2. Ahson	274.590	274.590	0.000
3. Talodhi	813.240	409.419	403.821
Total :	1506.600	1102.779	403.821

From the above figures, it is seen that 70.76% area is under encroachments which are long standing. The available area is very much degraded and over grazed. They are merely open grounds for the cattle to bask and breathe.

5.4.3.35. MISCELLANEOUS WORKING CIRCLE : In this working circle 15,315.075 ha area was included from the following categories.

- (i)Gaathan sites and cultivation.
- (ii)Areas along inter state boundary.
- (iii)Area with paucity of overwood.

5.4.3.36. Treatment prescribed : In the compartments containing groups of natural regeneration, cutting back and cleaning operations were prescribed.

5.4.3.37. Effect : No such operations were carried out, and the inter state border dispute is also not resolved yet.

5.4.4.1. General outcome of the Kulkarni's working plan : If we compare the general objects of management of Kulkarni's plan and the effects of the prescriptions given for the working of various working circles it projected a rather dim picture.

- (i)Since no soil conservation measures were taken during the plan period, instead of combating the ill effects of soil erosion, it had actually been accelerated.
- (ii)The local demand for timber, firewood and charcoal had of course been satisfied, not only to the extent the forests could bear but even in excess of the bearance capacity of these forests. The local demand got satisfied by the local population by illicitly cutting the trees and encroaching upon forests land and thus degrading the forests to a large extent. The outside demand was also satisfied to the extent the forests could bear.
- (iii)Due to the teak plantations taken in conversion and miscellaneous plantation working circles after clear felling the area, value of the forests has increased over an about 3140 ha area (i.e. 4.21% of the total area covered by the plan). However, no plantations taken in the Selection cum Improvement working circle.
- (iv)Whether the demand of the various industries was satisfied or not is not known, since the figures are not available. But from the general observation it seems that the demand might not had been satisfied to the desired extent.
- (v)The degraded forests had not been converted into pastures. But the said areas have mostly gone under encroachments. As a result the grazing needs of the cattle were not satisfied properly. Since the cattle cannot remain without food, they got their hunger satisfied by grazing in all the forest areas, even in plantations and thus assisting in the degradation of the forests to a large extent.

(vi) Though the grazing settlement was done, grazing could not be regulated due to explosion in cattle population.

(vii) Even sustained yield could not be obtained. To get progressively increasing yield was out of question.

(viii) At least during the plan period, normal forests had not been created.

5.4.4.2. Conclusion : Thus, from the above discussion it was concluded that the general objectives as postulated in the working plan of Kulkarni had not been achieved mainly due to :

(i) Absence or inadequacy of natural regeneration.

(ii) Explosion in human and cattle population which resulted in increasing the pressure on the forests by many folds and thus accelerated the process of degradation of forests.

(iii) The executive agency could not check this degradation due to its various limitations.

(iv) To some extent negligence towards the prescriptions of the working plan due to lack of properly trained staff as well as inadequacy of the staff.

(v) Illiteracy and lack of knowledge among the population regarding the science of silviculture and intangible benefits of the forests and

(vi) Last but not the least the poverty of the major part of the population.

**WORKING PLAN OF S. S. MAHAJAN, R. N. BISWAS, V. B. PANDIT and
Dr. NAND KISHOR: (Period 1993-94 to 2002-2003):**

S.B. Kulkarni's plan was followed by the plan prepared by Shri S. S. Mahajan, R. N. Biswas IFS, V. B. Pandit and Dr. Nand Kishor IFS for period 1993-94 to 2002-2003. The stockmaps of the areas free from encroachment and with clear boundaries were carried out and fresh enumeration were also carried out. On the basis of stockmapping and enumerations areas were classified under tree forests, minor forests, miscellaneous forests and on the basis of (1) the situation and condition of the forests, (2) condition of regeneration of tree species, (3) the local needs of the population and availability of labour, staff and resources; following working circles were formed:

(i) Selection cum Improvement Working Circle,

(ii) Afforestation Working Circle,

(iii) Bamboo Overlapping Working Circle,

(iv) Miscellaneous Working Circle and

(v) Wildlife Overlapping Circle.

5.5.2.1. SLECTION CUM IMPROVEMENT WORKING CIRCLE: This working circle includes better forest area of Rajura, Garlapeth, Siddheshwar I & II, Manickgarh and Chicholi blocks comprising 28670.995 hectare of forests. The special objects of management are as follows:

(i) To utilize the full potential of the site for producing big sized timber and

(ii) To improve the forests, both in composition and density by suitable tending operations and plantation.

The area included in this working circle was partially miscellaneous forest and rest of the area was cleared felled and planted. To achieve the special objects of management the natural crop is to be worked to produce large sized timber and at the same time the natural regeneration would be allowed to grow. In the plantation areas crops have to be tended to achieve the maximum growth rate. The areas which are understocked and contain inadequate natural regeneration have to be artificially planted. The tending of natural regeneration and selection of species in plantation have to be done in such a way, so as to achieve 50% teak and 50% other miscellaneous species in the resultant crop.

On the basis of the growth of individual species, they have been divided into two classes: (1) Class-I: It includes teak, ain, bija, haldu, dhawada, salai, kalam. The selection girth for harvesting of these species is fixed at 120 centimeter and (2) Class II: It includes bhirra, rohan, tiwas and all other superior miscellaneous species except garari. Selection girth

for harvesting of these species is kept as 90 centimeter. Felling Cycle is fixed 20 years and the areas have been divided into 13 felling series.

5.5.2.4. Felling Rules are as follows : Area liable to erosion, blanks and understocked areas with density below 0.4 and one chain wide strips along nala banks are to be excluded from working. Steep slopes above 45° are to be demarcated as protection belts. In the workable areas enumeration of all trees above harvestable girth and approach class have to be done in 15 centimeter girth class before starting the marking. The following reservation have to be done: (1) All healthy trees of edible fruit and flower yielding trees of moha, tendu, aonla, chinch, bel and (2) All well grown and uniformly spread trees of teak and superior miscellaneous trees below selection girth for harvesting. Keeping in view the above restrictions, the marking for felling have been following types:

(i) All dead trees after leaving 2 trees per hectare. The retention of trees have to be made from inferior species as far as possible.

(ii) All live high stumps.

(iii) 50% of the trees above selection girth of harvesting uniformly spread over the whole coupe. However in the areas having slope 25° and more no. of trees have to be marked for felling unless crop density greater than or is equal to 0.7. Marking have to be done from higher girth trees to lower girth trees so that all the overmature trees would be removed during felling from harvestable girth class.

(iv) Singling of multiple coppice shoots to one vigorously growing coppice shoot.

(v) Very light thinning marking in the crop below preharvestable girth class. No sound tree have to be removed unless its removal benefits two other trees of the same girth class.

5.5.2.5. In the old plantation areas and group of young poles areas thinning marking in the natural pole crop have been done so as to make average spacement equal to $1/3^{\text{rd}}$ of the average height of the crop. For the plantations, the thinning have to be done as per the site quality classes. In understocked areas:

All dead trees have to be marked for felling provided their number is more than 2 per hectare.

All live high stumps to be cut to ground level.

5.5.2.6. The regeneration has to be obtained through natural regeneration as well as artificial regeneration. The natural regeneration has to be properly tended to enhance the growth of the seedlings. Artificial regeneration has to be carried out in well stocked areas with deficient in natural regeneration and in understocked areas. The artificial regeneration is to supplement the natural regeneration. Bamboo is to be planted in all type of areas. Minimum of which is not to be less than one half of the coupe area.

The following subsidiary silvicultural operations have to be carried out in the next year of main felling soon after completion of working and in the subsequent years.

(a) Cutting back operations:

i) All standing trees, marked for felling but not felled have to be felled.

ii) All damaged trees which are not likely to recover have to be felled.

iii) All malformed naturally regenerated seedlings have to be cut back to obtain vigorous coppice shoots.

iv) All growth of inferior species like lantana, dikamali and kharata interfering or likely to interfere with growth of teak and other valuable species have to be cut.

v) All climbers have to be cut.

(b) Cleaning: In the sixth year from the year of main felling, the following operation have to be carried out.

i) Climbers have to be cut all over the area.

ii) Inferior species interfering or likely to interfere with the growth of teak and other valuable miscellaneous species have to be cut.

iii) Damaged seedlings due to wildlife and illicit cutting, malformed seedlings or coppice shoots have to be cut.

iv) Coppice shoots on each stump have to be reduced to not more than 2 well spaced out vigorous shoots.

v) In the plantations and naturally regenerated areas also cleaning works have to be done.

© **Thinning:** Thinning has to be carried out in the 11th year from the year of main felling. Following rules are laid down.

i) All climbers have to be cut.

ii) All dead, badly damaged or uprooted trees have to be felled.

iii) Coppice shoots on each stump have to be reduced to 1 vigorously growing shoot.

iv) In group of young pole crop of natural teak, thinning have to be carried out so that average spacement of the crop left have to be 1/3rd of the height of of the crop.

v) The thinning in old plantations has to be as per the yield table and site quality.

vi) Area is to be strictly fire protected for the period of five years after main felling.

vii) The area is to be closed for grazing for five years after plantation and in the case of natural regeneration after main felling.

5.5.2.8. RESULTS: Some of the encroached areas have also been included in this working circle making the operations to be impossible and the future crop is imaginary. In the well stocked areas the result of selection is very good. The crop is getting structured composition and regeneration has been achieved either naturally or artificially as per the site requirement.

5.5.3.1. AFFORESTATION WORKING CIRCLE: The area included in this working circle are relatively inferior to the areas included in the Selection Cum Improvement Working Circle. The compartments which have degraded or where plantations have failed in the Conversion Working Circle of S. B. Kulkarni's plan have to be included in this working circle. One compartment of Miscellaneous Working Circle and all compartments of Coppice With Reserve Working Circle of S B Kulkarni's plan have been included in this working circle. The total area included in this working circle is 7113.875 hectare. The main objects of management are:

To reclaim the area by intensive soil and moisture conservation works and afforestation.

(ii) To enhance the productivity of the forest land.

To involve the local people.

To meet the demand of local people of small timber, fuelwood and fodder.

5.5.3.2. The area under this working circle was stockmapped. The crop contains mostly middle aged to mature trees. The density of the crop varies from 0.5 to understocked and blank areas. 6 Felling Series with 20 coupes each FS have been formed. Mode of regeneration is mainly with artificial regeneration supplemented with natural regeneration.

5.5.3.3. RESULTS: People involvement in afforestation work is not upto mark as it was expected. The afforestation of areas are not as per the sequence given in the plan. The target of plantation are imposive on executive rather than site specific. The soil and moisture conservation works are inadequate or negligible. Success of survival of plantations so raised is not impressive and in most of the areas it tends to be failure.

5.5.4.1. BAMBOO OVERLAPPING WORKING CIRCLE: An overlapping bamboo working circle covering bamboo bearing forests over 29137.43 hectare 74 compartments and 6 sub compartments have been formed. After gregarious flowering during 1986 to 1988 clump formation is in process. The objects of management are: (1) To meet the local demand and (2) To harvest bamboo on scientific lines so as to get the maximum sustained yield. 6 Cutting Series with 3 cutting section each have been carved. The cutting rules are as follows:

i) Clumps having less than 8 culms are to be treated as understocked and are not to be harvested.

ii) During 15th June to 15th September felling is prohibited.

iii) Culms less than one year old are not to be felled.

iv) All dead, dying and malformed culms are to be cut.

- v) A minimum of 8 green culms including current years culms, well distributed over the clump are to be retained.
- vi) Culms are to be cut obliquely between 15 cms to 45 cms from the ground level.
- vi) Digging of rhizomes, cutting tops of bamboo or cutting of tender bamboo is prohibited.
- vii) If bamboo flowering is noticed then that clump felling is deferred till the seeding is completed.
- viii) All climbers infesting bamboo clumps have to be removed.

5.5.4.2. RESULTS: As it has been mentioned that crop is in various stages of development and the clump formation is yet to complete and therefore hygienic operations have to be done in the coupe for working and the prescriptions given for cutting of bamboo would be operative only after the clumps are mature for harvesting. No specific hygienic operations have been given in the plan. In the absence of any concrete operations to be carried out for the formation of clumps no hygienic works has been taken at all. No mature clump formation has been noticed. Cutting of bamboo is out of question. Due to lack of proper and concrete prescriptions clump formation process has got set back and the crop is in bad shape.

5.5.5.1. MISCELLANEOUS WORKING CIRCLE: This working circle includes following types of areas:

- i) Area under proposed Manickgarh Forest Park. (1,659.209Ha).
- ii) Area under Lease. (501.960Ha).
- iii) Area along interstate boundary dispute. (2,16.367Ha).
- iv) Areas of Manickgarh, Kawitgaon, Ahson, Kanhergaon and Talodhi blocks which are mostly under encroachment and areas of Jaitapur, Naranda and Erai blocks which are totally under encroachment or cultivation. (32,751.383Ha).
- v) Total area covered under this working circle is 37,828.919 hectare spread over 92 full compartments, 4 part compartments and 29 sub compartments. The method of treatments to the respective areas are as follows:
 - i) Special scheme needs to be prepared for the development of Manickgarh Forest Park.
 - ii) The area will remain under lease.
 - iii) Interstate border dispute should be settled and boundary should be demarcated permanently as early as possible.
 - iv) To regularise the encroachment in these areas special scheme has to be carried out.
- V) Area free from encroachment has to be protected from grazing, fire and illicit cutting.
- Vi) Plantation taken have to be maintained while plantation have to be taken in remaining areas with involvement of local people.

RESULTS: Following observations are made:

- i) No Forest Park has been created so far.
- ii) As per Deputy Conservator of Forests Central Chanda no forest area is under Inter State Border Dispute. Only permanent boundary marks are not on the Inter State Boundary. Errection of permanent boundary marks has so far not taken along the inter state boundary.
- iii) No special scheme has been prepared to regularise the encroachments.
- iv) Some plantations have been taken in the areas free from encroachment. But the survival of plantations taken so far is inadequate due to lack of control over grazing.

5.5.6.1. WLIDLIFE OVERLAPPING WORKING CIRCLE: This overlapping working circle covers the entire area of the Rajura, Wansadi and Wirur forest ranges of this division except the proposed for Manickgarh Forest Park for which separate scheme is to be prepared and is about 71,951.580 ha. Following prescriptions are made for the protection of wildlife in the tract.

- i) While preparing the treatment map of a coupe for felling in any of the working circle potential habitat of wildlife and existing waterholes will also be identified and have to be shown on the treatment map.

- ii) Marking of dead trees in any felling coupe have to be done only if their number is more than 2 trees per hectare. These trees have to be required to provide snags and den for nesting and resting of the wildlife. Trees of commercially low utility may be used for this purpose.
- iii) During harvesting some unsound and hollow logs of commercially low utility, not exceeding 3 per hectare have to be left in the forest to serve as shelter for wildlife.
- iv) In the plantations few trees of fruit species like gular etc. will also be planted to provide food to wildlife.
- v) The water holes which are frequently used by wild animals have to be excluded for grazing by making a special mention of such areas in the grazing permit/licence.
- vi) Vigilant watch have to be kept on poachers also at the checking gates erected to check/prevent the transport of illicit forest produce.
- vii) The labour camps and transit depots have to be established away from the high wildlife density areas.
- viii) Hoardings on the importance of wildlife and protection have to be exhibited at strategic locations.
- ix) The provisions contained in wildlife(Protection) Amendment Act 1991 have to be enforced rigidly.
- x) Suitable location have to be identified where forest tanks have to be constructed to provide water to the wildlife.

5.5.6.2. RESULTS: To create awareness towards wildlife every year wildlife week is observed in the 1st week of October. Strict vigilance is over entire tract regarding wildlife protection. Some Vantalis (Forest Tank) have been constructed with aim to provide water to wildlife. Though these measures are inadequate to protect and conserve wildlife, the efforts are in right direction in protection of wildlife.

5.5.7.1. General outcome of this working plan : If we compare the general objects of management of this plan and the effects as are seen today of the prescriptions given for the working of various working circles it does not project a healthy scene to existing crop and its future.

Since no adequate soil conservation measures are being taken during the plan operation period, instead of combating the ill effects of soil erosion, it is actually being accelerated.

(ii) The concern to meet the local demand for timber, firewood and charcoal has gone in backyard. The capacity of forests is not to the extent to fulfil the local demand to fullest extent and keep the health of forest in a good shape in the present and in future.

(iii) To meet the outside demand, the forest cannot be sacrificed.

Due to the teak and miscellaneous plantations taken in various areas under Maharashtra Forestry Project and other schemes value of the forests has increased. People participation in forest management is being sought and it is being felt that people cooperation is essential if we want to conserve the forests for prosperity and upliftment of environment and mankind.

Whether the demand of the various industries is satisfied or not is not known, since the figures are not available. But from the general observation it seems that the demand might not have been satisfied to the desired extent.

(vi) The degraded forests are being converted into productive forest producing fodder and grasses. But those areas which have mostly gone under encroachments revival of forests are out of question.. As a result the grazing needs of the cattle are not satisfied properly. But since the cattle cannot remain without food, they get their hunger satisfied by grazing in all the forest areas, even in plantations and thus assisting in the degradation of the forests to a large extent.

(vii) Since the grazing settlement has not been so far done, grazing cannot be regulated to the possible extent to the carrying capacity of existing forests.

(viii) As sustained yield cannot be ascertained due to lack of normal forest structure, the optimum yield is out of question in near future.

(ix) During the execution of this plan, normal forests have not been created.

5.5.7.2. CONCLUSION: Thus, from the above discussion it can be concluded that the general objectives as postulated in this working plan have not been achieved mainly due to –

(a) Absence or inadequacy of natural regeneration in areas near human habitat.

(b) Explosion in human and cattle population which resulted in increasing the pressure on the forests by many folds and thus accelerated the process of degradation of forests. The executive agency cannot check this degradation due to its various limitations.

© Improper or inadequate execution of prescriptions of the plan.

(d) Illiteracy and lack of knowledge among the population regarding the science of silviculture and intangible benefits of the forests.

(e) Lack of motivation of people in participation of development of common resource i.e. forests.

(f) Last but not the least the poverty of the major part of the population.

5.5.7.3. To avoid the further degradation and improve the growing stock, the forests have to be considered as assets of future. Forests have to be treated in such a way that normalcy is achieved and optimal flow of goods and services are rendered by these forests to the humankind and environment

SECTION: 5.6.1.1. PAST YIELD : The annual out-turn of timber, poles, firewood, bamboo and minor forest produce for last 10 years have been given in appendix no XI

SECTION: 5.7.1.1. PAST REVENUE AND EXPENDITURE : The statement showing revenue and expenditure of last 10 years have been given in appendix no XIII.

CHAPTER – VI

STATISTICS OF GROWTH AND YIELD

SECTION:6. 1 : STATISTICS OF RATE OF GROWTH OF TEAK AND MISCELLANEOUS SPECIES :

6.1.1.GROWTH OF TEAK :

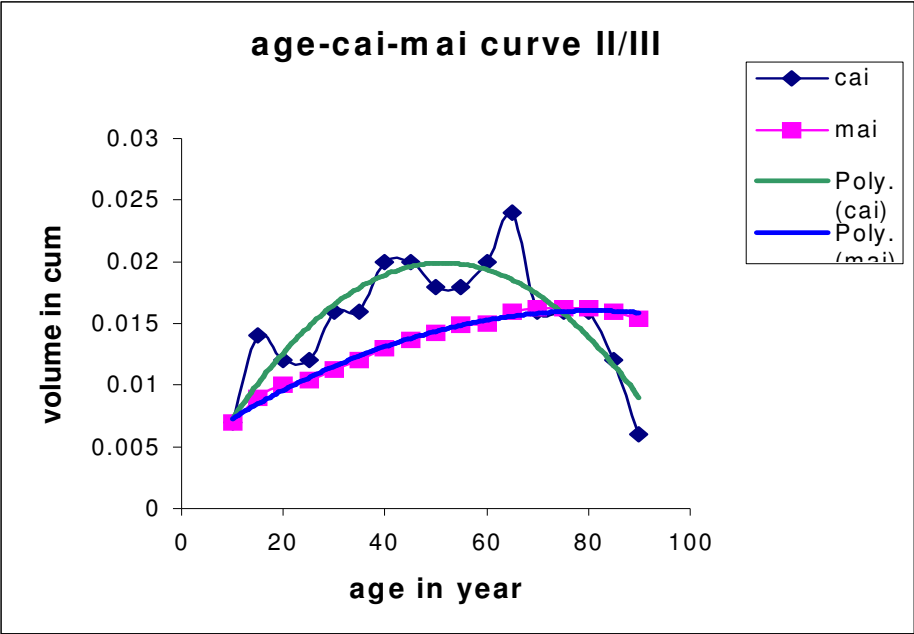
6.1.1.1. During the preparation of this plan stem analysis of 6 teak trees from Watrana forests were carried out by the team of working plan division Yavatmal. The data so collected were computed site quality wise and are given in appendix no XII of this draft working plan report.

6.1.1.2. Data for DBH(OB), GBH(OB), Height, Volume, Current Annual Increment and Mean Annual Increment computed for Teak Site Quality II/III are produced here as follows:

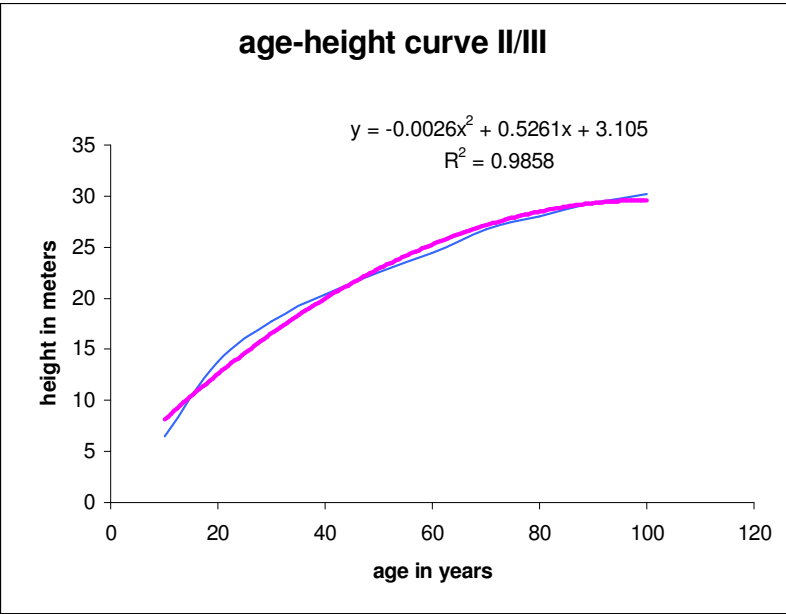
Age in years	D.B.H.O. B. in cms.	G.B.H.O.B. in cms.	Ht. In Mtrs.	Volume cum	CAI Cmt/tree	MAI Cmt/tree
5						
10	13.6	42.8	6.5	0.070	0.007	0.007
15	17.1	53.8	10.2	0.120	0.014	0.009
20	20.4	64.2	13.8	0.205	0.012	0.010
25	23.6	74.1	15.8	0.291	0.012	0.0104
30	26.5	83.4	17.8	0.340	0.016	0.0113
35	29.3	92.2	19.1	0.463	0.016	0.0120
40	31.9	100.4	20.4	0.520	0.02	0.0130
45	34.4	108.1	21.5	0.637	0.02	0.0137
50	36.6	115.1	22.6	0.710	0.018	0.0142
55	38.7	121.7	23.1	0.813	0.018	0.0149
60	40.6	127.7	24.5	0.920	0.02	0.0150
65	42.4	133.1	25.6	0.991	0.024	0.0160
70	43.9	138.0	26.7	1.140	0.020	0.0163
75	45.3	142.3	27.3	1.220	0.016	0.0163
80	46.5	146.1	28	1.300	0.016	0.0163
85	47.5	149.3	28.7	1.352	0.012	0.0160
90	48.3	151.9	29.4	1.390	0.006	0.0154

cai and **mai** curve for II/III intersect each other at the age of 75 year and average volume per tree is 1.22 cubic metre which corresponds mean and current annual increment to 0.016 cubic metre per year and girth at breast height 142.3 centimetre.

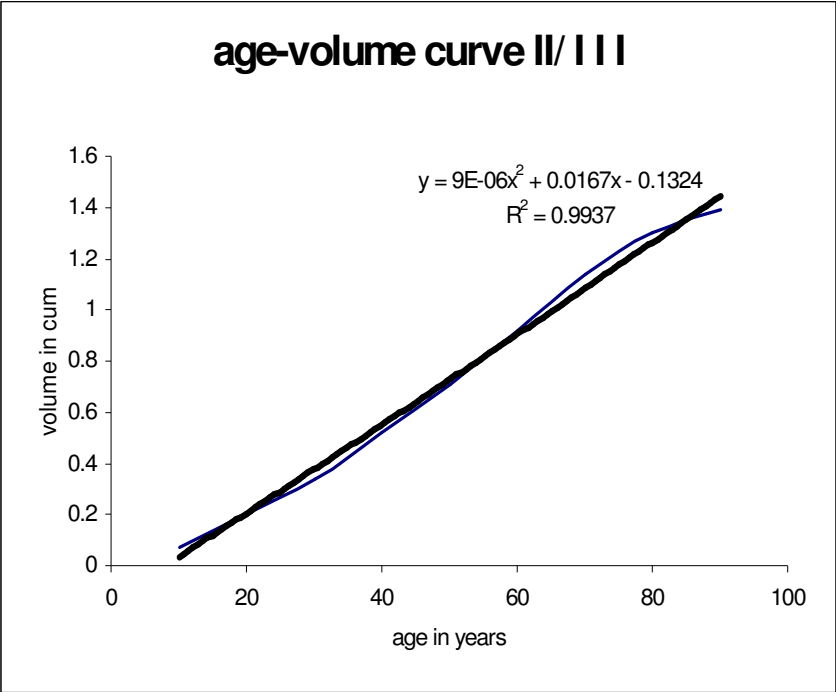
6.1.1.3. CURVE FOR CAI AND MAI AGAINST AGE



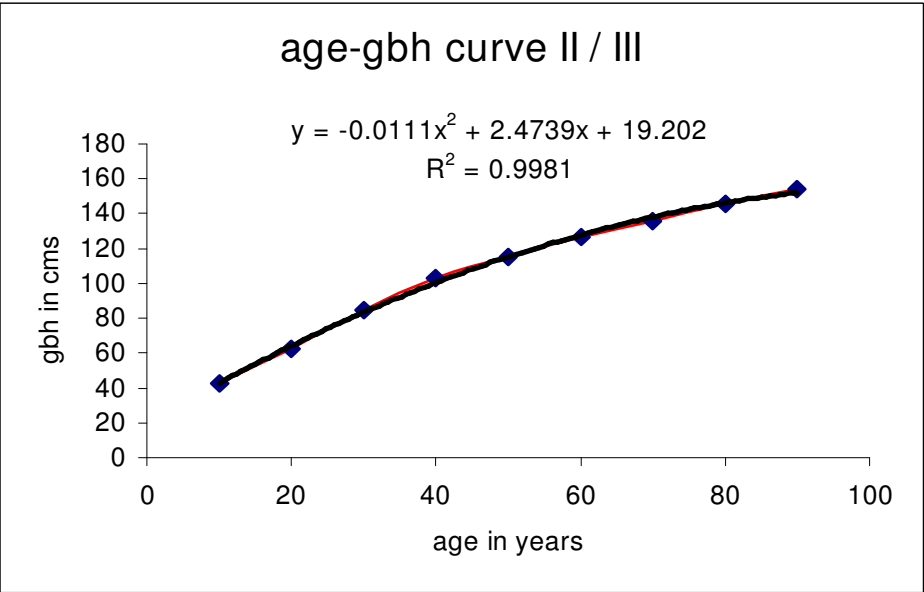
6.1.1.4. Age- height for Teak Site Quality II/III is given below as follows:
AGE-HEIGHT CURVE (SITE QUALITY II/III) :



6.1.1.5. AGE-VOLUME CURVE (SITE QUALITY II/III) :



6.1.1.6. AGE-GBH CURVE (SITE QUALITY II/III) :

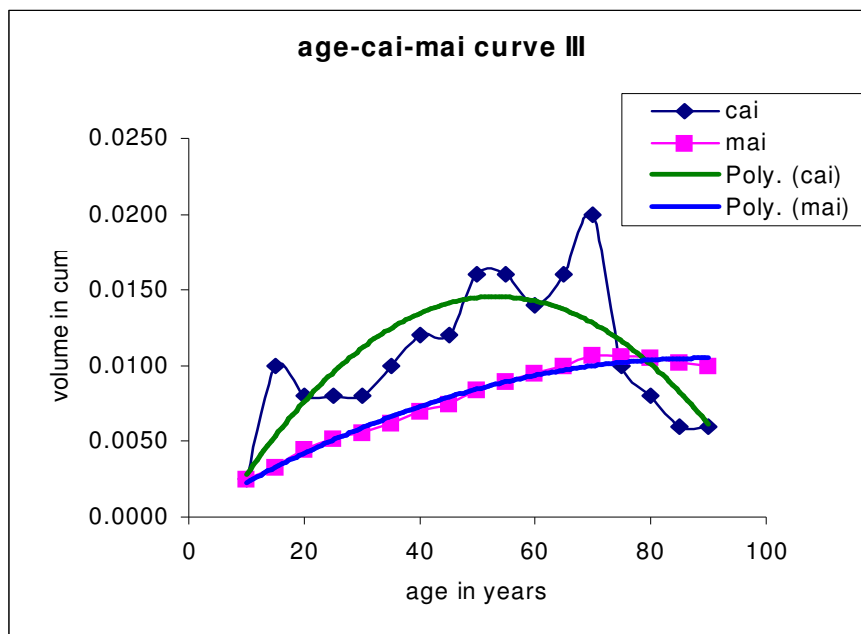


6.1.2.1. Data for DBH(OB), GBH(OB), Height, Volume, Current Annual Increment and Mean Annual Increment computed for **Teak Site Quality III** are produced here as follows:

TEAK SITE QUALITY III

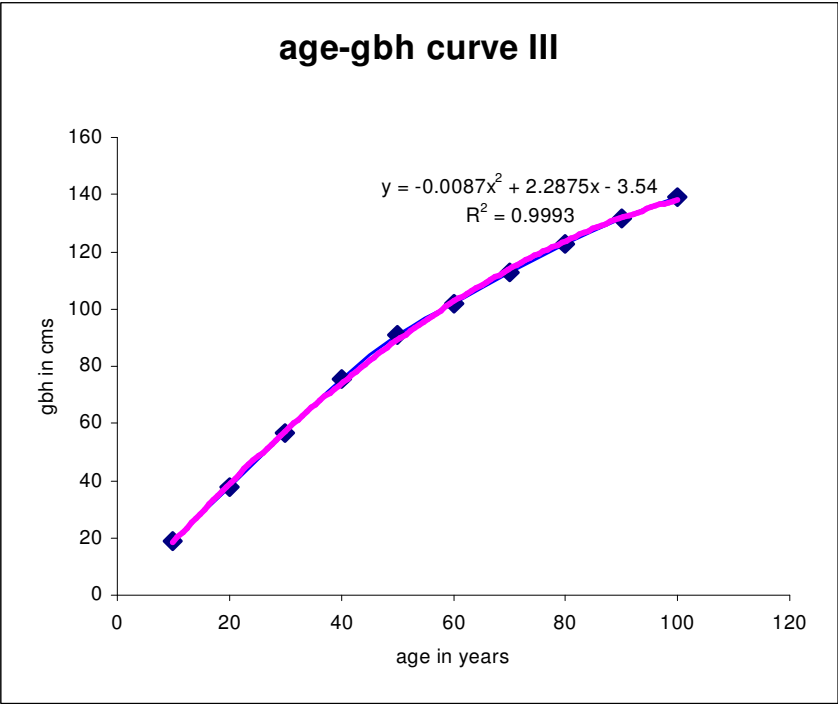
Age in years	D.B.H.O. B. in cms.	G.B.H.O.B. in cms.	Ht. In Mtrs.	Volume cum	CAI Cmt/tree	MAI Cmt/tree
1	2	3	4	5	6	7
10	6.0	18.8	5.4	0.025	0.0025	0.0025
15	8.8	27.8	7.0	0.050	0.0100	0.0033
20	12.0	37.7	9.4	0.090	0.0080	0.0045
25	14.3	44.8	10.8	0.130	0.0080	0.0052
30	18.0	56.5	12.2	0.168	0.0080	0.0056
35	21.3	67.0	13.2	0.217	0.0100	0.0062
40	24.0	75.4	14.2	0.280	0.0120	0.0070
45	26.3	82.8	15.4	0.338	0.0120	0.0075
50	29.0	91.0	16.5	0.420	0.0160	0.0084
55	30.7	96.5	17.2	0.495	0.0160	0.0090
60	32.5	102.0	18.0	0.570	0.0140	0.0095
65	34.2	107.5	18.8	0.650	0.0160	0.0100
70	36.0	113.0	19.6	0.749	0.0200	0.0107
75	37.5	117.9	20.3	0.795	0.0100	0.0106
80	39.0	122.5	21.0	0.840	0.0080	0.0105
85	41.6	130.8	21.6	0.867	0.0060	0.0102
90	44.3	139.1	22.5	0.900	0.0060	0.0100

6.1.2.2. CAI and MAI curve for III intersect each other at the age of 71 year and average volume per tree is 0.80 cubic metre which corresponds mean and current annual increment to 0.0106 cubic

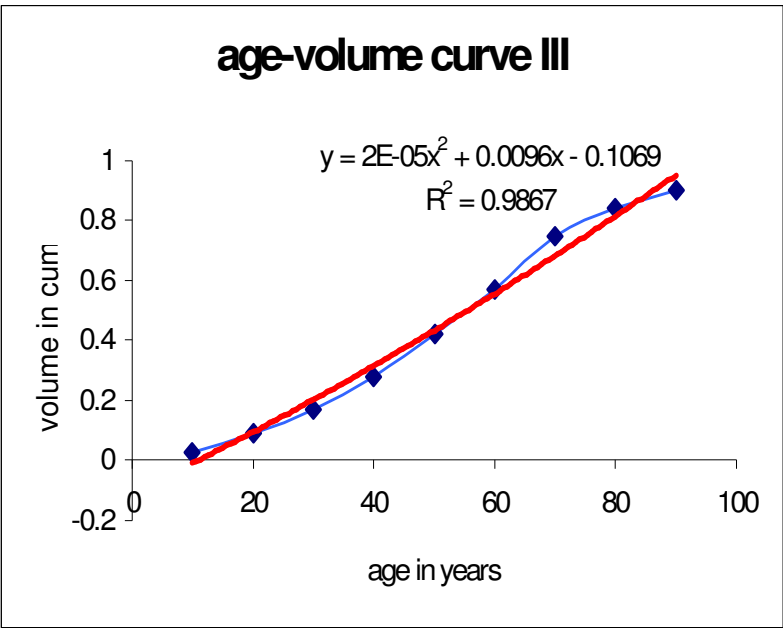


metre per year and gbh 122 centimetre.

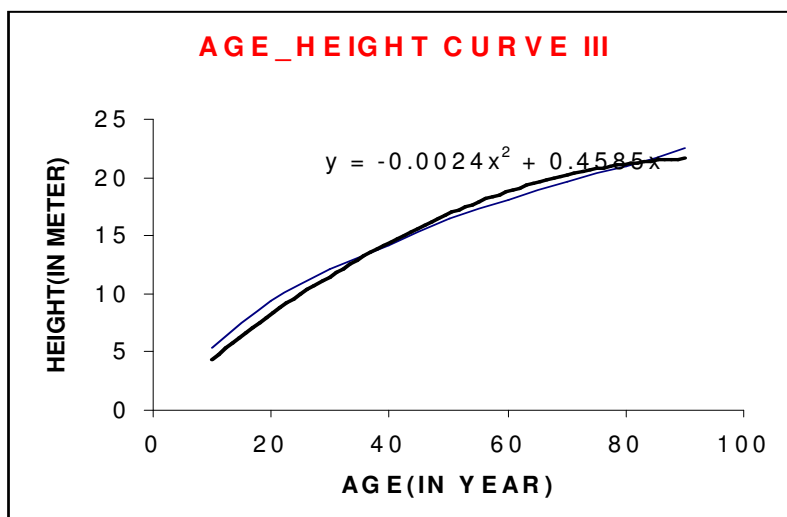
6.1.2.3. AGE-GBH(OB) CURVE (SITE QUALITY III):-



6.1.2.4. AGE-VOLUME CURVE (SITE QUALITY III) :



6.1.2.5. AGE HEIGHT CURVE (SITE QUALITY III)

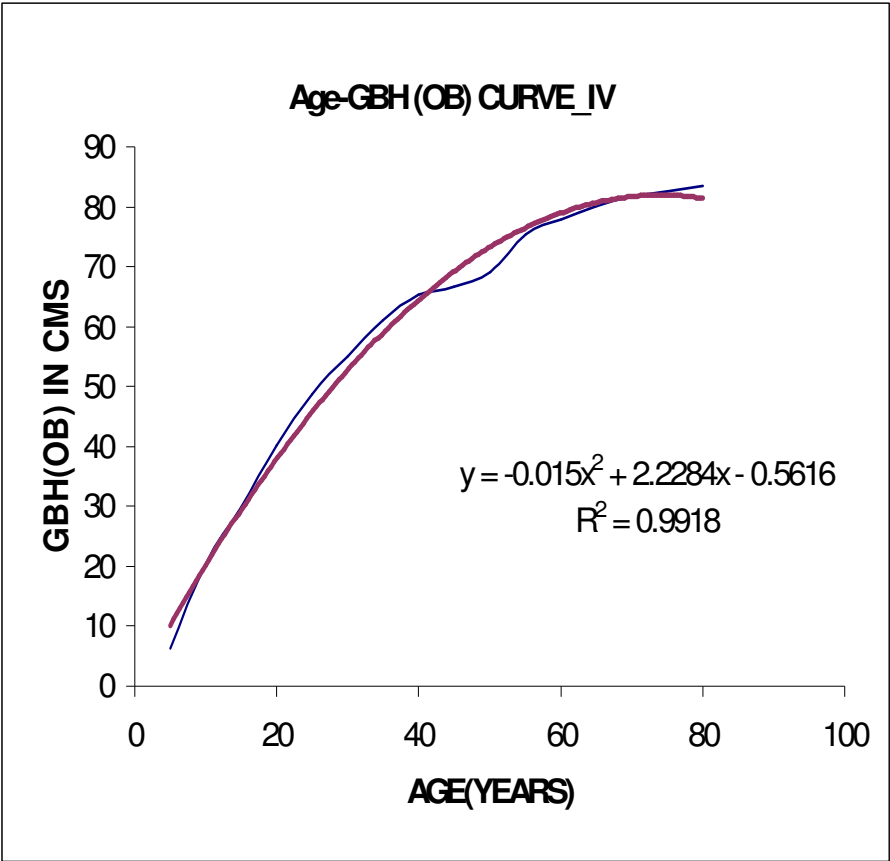


During the preparation of working plan of Pandharkawada Forest Division stump/stem analysis had been carried out by the DCF WP Yavatmal during 1999-2000. 10 Trees each from III/IV and IV of all India Teak Site Qualities were selected from Parwa, Umari and Pandharkawada Ranges and analysed. It is seen that CAI and MAI curves for III/IV and IV teak site qualities cut in the 75th and 50th years, which correspond to 98.9 cms and 73 cms g.b.h.(o.b.) with corresponding current annual increments (c.a.i.) 0.0072 cubic meter/year and 0.0053 cubic meter/year respectively.

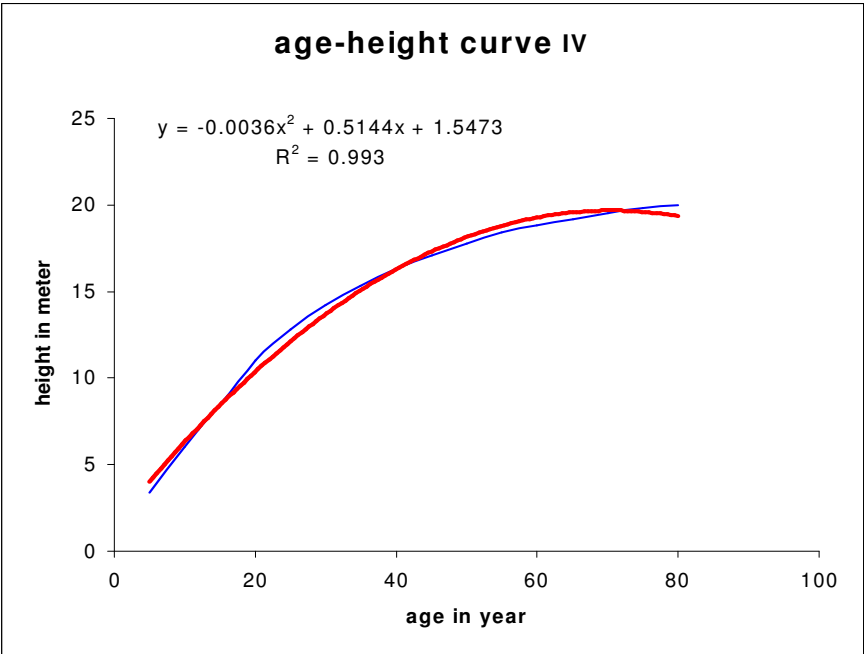
Teak Site Quality IV

Age in years	D.B.H.O. B. in cms.	G.B.H.O.B. in cms.	Ht. In Mtrs.	Volume cum	MAI Cmt/tree	CAI Cmt/tree
5	02.0	006.3	03.4	0.0090	0.0018	0.0018
10	06.5	020.4	06.0	0.0300	0.003	0.006
15	09.5	029.8	08.5	0.0540	0.0036	0.0108
20	12.8	040.2	11.0	0.0840	0.0042	0.0168
25	15.5	048.7	12.8	0.1125	0.0045	0.0225
30	17.5	055.0	14.2	0.1410	0.0047	0.0282
35	19.4	061.0	15.3	0.1785	0.0051	0.0357
40	20.8	065.3	16.3	0.2080	0.0052	0.0416
45	21.2	066.6	17.1	0.2385	0.0053	0.0477
50	23.2	069.1	17.8	0.2650	0.0053	0.053
55	24.0	075.4	18.4	0.2915	0.0053	0.0583
60	24.8	077.9	18.8	0.312	0.0052	0.0624
65	25.5	080.1	19.2	0.3315	0.0051	0.0663
70	26.0	081.6	19.5	0.3360	0.0048	0.0672
75	26.3	082.6	19.8	0.3375	0.0045	0.0675
80	26.6	083.5	20.0	0.3380	0.0042	0.0672

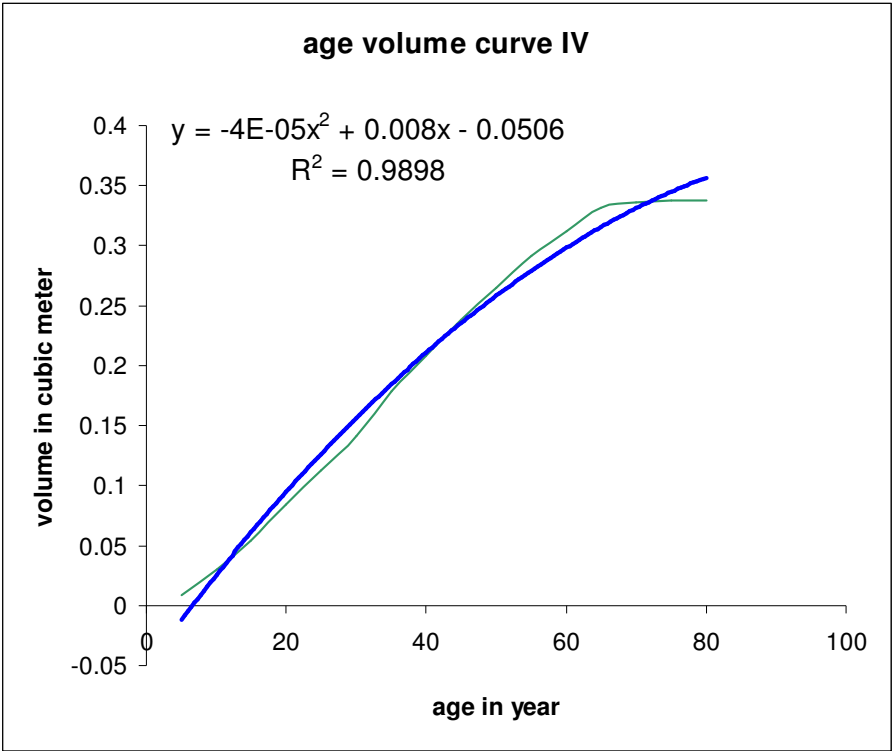
6.1.3.2. AGE-GBH CURVE FOR TEAK SITE QUALITY IV



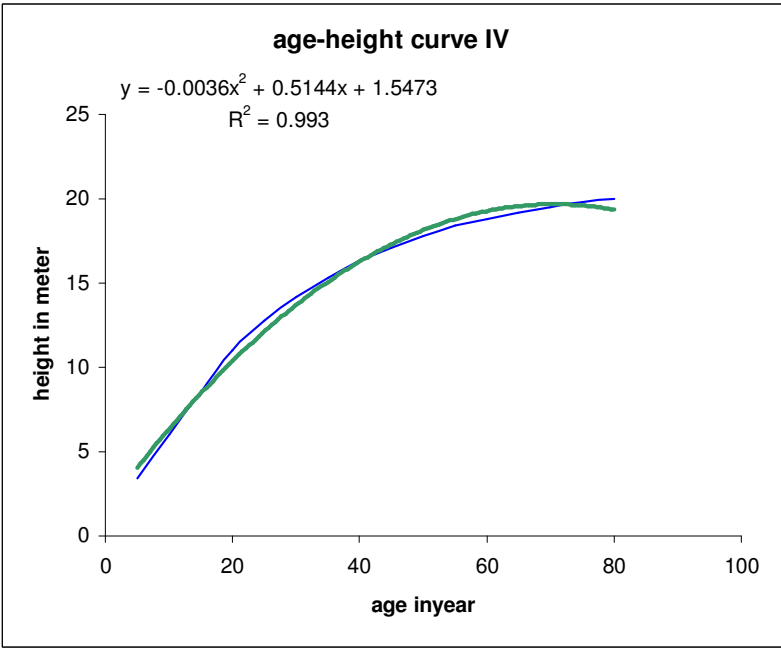
6.1.3.3. AGE-HEIGHT CURVE FOR TEAK SITE QUALITY IV



6.1.3.4. AGE-VOLUME CURVE FOR TEAK SITE QUALITY IV



6.1.3.5. AGE-HEIGHT CURVE FOR TEAK SITE QUALITY IV



GROWTH OF MISCELLANEOUS SPECIES :

6.1.4.1. In the year 1931 based on 221 borings on 57 trees from Dhaba Range was analysed in the office of the Central Silviculturist Dehradun which indicated the following rate of growth of semal.

GROWTH OF SEMAL

Age in year	DBH(OB) in cms	Number of trees
20	(14.22)	-
30	(21.59)	2
40	28.94	28
50	36.32	15
60	43.43	4
70	50.54	7
80	57.40	1
90	64.52	-

(Figures in brackets are based on extrapolation of curves.)

6.1.4.2. During revision of Tasdique Hussain's plan, Dashputre, in the year 1954, collected data for a wider range of representative quality classes from Aheri and Dhaba Ranges by analysing 80 semal trees by ring counting at breast height. The results obtained are reproduced as given below.

GROWTH OF SEMAL

Age in Year	DBH(OB) in cms
20	14.22
30	20.60
40	26.92
50	33.37
60	39.62
70	(47.24)

(Figure in bracket is based on extrapolation of curves.)

6.1.4.3. From above it is seen that the semal tree of gbh 105 cms takes about 15 years to attain a gbh 135 cms.

6.1.4.4. The data, collected in the year 1944, of semal by the state silviculturist, Central Province and Berar, by taking detailed measurements of 67 standing trees for estimating log out-turn is reproduced as below .

OUT TURN OF SEMAL

Girth Classes	Log out turn in cubic meter		Average
	III Quality	IV Quality	
90-120	0.565	-	-
121-150	0.878	0.537	0.702
151-180	1.132	0.821	0.976
181-210	1.868	1.557	1.712
211-240	2.067	-	-

6.1.4.5. The data for rate of growth of semal collected in the year 1975 from Mul Range of West Chanda Forest Division, is given as below :

RATE OF GROWTH OF SEMAL

Age in year	DBH(OB) in cms
10	03.3
20	10.0
30	17.0
40	24.4
50	32.0
60	40.0
70	48.0

6.1.4.6. Based on the number of years required to attain the average of each girth class, using rate of growth data of 1931 and using diameter, girth conversion table for U.P., the log out-turn per year for the average of each girth class was calculated and found to be as under.

OUT TURN OF SEMAL

Girth (cm)	Log out-turn in cum/ha
106 – 68	-
137 – 16	0.2379
152 – 40	0.01822
167 – 64	0.01287

It was concluded from the above data that 137.16 cm was the size yielding highest log out-turn per hectare. Rotation for semal is, therefore, based on the above data.

6.1.4.7. Growth data for semal species obtained from the even aged tree increment plot in Bhandara Forest Division is reproduced as below:

(GROWTH OF SEMAL IN BHANDARA)

Age in year	GBH(OB) in cm
34	30.48
63	45.72
97	76.20
123	106.68
151	137.16

6.1.5.GROWTH OF AIN :

6.1.5.1. Data obtained from ring counting on 107 stumps in the year 1957 in high quality mixed forests of Dhaba Range is reproduced from Dasputre's plan as below:

GROWTH OF AIN IN DHABA

Age in year	GBH(OB) in cm
95	91.44
104	106.68
114	121.92
125	137.16
139	152.40
155	167.64

6.1.5.2. Rate of growth as ascertained by Donald (in 1913) by counting of rings of a few ain trees is reproduced as below :

GROWTH OF AIN

Girth in cm	Age in year	MAI (cubic meter)
15	08.50	-
30	17.00	0.225
45	25.50	-
60	47.00	0.175
75	76.00	0.125

6.1.5.3. Growth data of ain, as given in the working plan of East Chanda and Bhandara Forest Divisions written by Kartar Singh and Nigam; Patil and Sardar respectively and results of stem analysis of Jimalgatta Range of Sironcha Division carried out in 1990 are reproduced as below :

GROWTH OF AIN

Age in Year	Mean G.B.H. (O.B.) in Cms.		
	East Chanda	Bhandara	Jimalgatta
10	11.0	11.9	12.2
20	21.0	26.7	27.4
30	30.0	38.5	39.6
40	39.0	50.3	52.2
50	49.0	59.7	60.1
60	58.0	(70.2)	72.3
70	67.5	(80.0)	83.15
80	78.0	(91.0)	93.23
90	88.0	(102.0)	104.53
100	99.0	(112.0)	120.27

Figures in brackets are obtained from extrapolation of the curves. The MAI and CAI tend to intersect at the age of 120 years which correspond to gbh more than 135 cm

6.1.6. GROWTH OF BHIRRA, DHAWADA & TENDU :

6.1.6.1. The results of stump analysis of bhirra, dhawada and tendu carried out by Kartar Singh during the preparation of working plan for East Chanda Forest Division are reproduced as below :

GROWTH OF BHIRRA

Species	GBH incms	DBH in cms	Age in year
Bhirra	015	04.8	012
	030	09.5	024
	045	14.3	033
	060	19.1	043
	075	23.9	055
	090	28.6	067
	105	33.4	079
	120	38.2	092
	135	43.0	108
	150	47.7	120

GROWTH OF DHAWADA

Species	GBH incms	DBH in cms	Age in year
Dhawada	015	04.8	016
	030	09.5	028
	045	14.3	050
	060	19.1	052
	075	23.9	066
	090	28.6	080
	105	33.4	093
	120	38.2	107
	135	43.0	123
	150	47.7	142

GROWTH OF TENDU

Species	GBH incms	DBH in cms	Age in year
Tendu	015	04.8	012
	030	09.5	026
	045	14.3	039
	060	19.1	052
	075	23.9	066
	090	28.6	081
	105	33.4	098
	120	38.2	120
	135	43.0	154
	150	47.7	

6.1.7.GROWTH OF BIJA :

6.1.7.1.Growth data of bija obtained from stem analysis of 6 trees of Bhandara Forest Division carried out by Sardar during the preparation of working plan for Bhandara are reproduced as below :

GROWTH OF BIJA

Age in Year	Height in mt.	DBH (UB) cms	DBH (OB) cms	Standard stem timber volume (M ³)	C.A.I. M ³	M.A.I. M ³
10	03.00	02.70	04.00	0.002	0.0002	0.000200
20	05.90	08.00	10.00	0.015	0.0013	0.000750
30	08.50	13.22	15.70	0.550	0.0040	0.001833
40	11.10	18.20	20.90	0.130	0.0075	0.003250
50	13.30	23.00	25.90	0.237	0.0107	0.004740
60	15.60	27.75	30.80	0.385	0.0148	0.006416
70	17.75	32.02	35.20	0.598	0.0213	0.008543
80	(19.80)	35.58	38.80	0.788	0.0190	0.009850
90	(21.80)	37.90	41.20	0.900	0.0112	0.010000

Figures in brackets are based on extrapolation of curves. C.A.I. and M.A.I. intersect at the age of 91 years. Areas are capable of growing sound trees of height 21.8 m and diameter 41.20 cm in 90 years.

6.1.8.GROWTH OF SHISHAM :

6.1.8.1.Stump analysis was carried out in Jimalgatta Range in 1990. Results are as under.

GROWTH OF SHISHAM

Age in Year	DBH (OB) in cms
10	04.15
20	07.23
30	11.21
40	14.56
50	17.37
60	19.72
70	22.53
80	25.55
90	29.15
100	33.23
110	38.14
120	42.60

The MAI and CAI curves tend to intersect at the age of 121 years which corresponds to gbh 135 cm Above this diameter, 80% trees showed signs of hollowness.

6.1.9.GROWTH OF KHAIR :

6.1.9.1. Ring counting was done on 173 khair stumps in Aheri and Dhaba ranges, the results of which are reproduced as follows :

GROWTH OF KHAIR

Age in Year	Girth in cm
20	23
25	30
30	35
35	43
40	48
45	55
50	60

The MAI and CAI curves intersect at the age of 53.5 year, which corresponds to 62 cm gbh.

6.1.9.2. INTRINSIC SOUNDNESS IN KHAIR TREES : Results of analysis are given as below :

GROWTH BEHAVIOUR OF KHAIR

Particulars	Girth Class in cm		
	45-60	60-90	>90
% of trees affected by fungus and other defects	24%	45%	44%
% of Trees intrinsically sound	78%	52%	56%
% of soundness in each girth class.	35%	22%	18%

Growth data of dhawada, tendu, garari, tinsa, aonla, moha, lendia and bel obtained from various working plans are reproduced as follows :

GROWTH DATA OF DHAWADA, TINSA, AONLA, BEL, LENDIA, GARARI, MOHA, AND TENDU:

Age in year	GBH(OB) in centimeters							
	Dhawada	Tinsa	Aonla	Bel	Lendia	Garari	Moha	Tendu
	Indore WP	Kandwa WP			Bhandara WP			
10	11.0	12.7	15.2	19.1	15.7	14.2	16.7	15.2
20	21.0	25.4	26.4	28.2	28.7	25.1	26.4	24.5
30	31.5	35.9	35.8	36.1	33.5	33.5	35.4	33.2
40	42.0	41.1	(43.0)	(43.2)	(37.2)	38.1	40.9	39.6
50	43.7	(48.0)	(48.0)	(39.2)	(40.6)	44.3	44.0	46.2

6.1.11. GROWTH OF ROHAN AND SALAI :

6.1.11.1. Growth data for rohan and salai obtained from various working plans are reproduced as below :

GROWTH OF ROHAN AND SALAI

Age in Year	Rohan [Maltland (CENTRAL PROVINCE) WP]		Salai [Indore W.P.]	
	Girth(cm)	Height (mt)	Girth(cm)	Height (mt)
05	06.6	1.98	06.3	05.1
10	13.7	3.45	09.8	07.3
15	19.6	4.51	11.4	08.9
20	25.4	5.49	12.4	10.2
25	30.0	6.45	15.2	11.3
30	34.3	6.92	(23.0)	(12.2)
35	(36.5)	(8.40)	(26.5)	(13.0)
40	(38.0)	(8.85)	(30.3)	(13.7)
45	(39.5)	(9.20)	(34.3)	(14.4)
50	(40.0)	(9.45)	(38.3)	(14.9)

6.1.12. GROWTH OF COPPICE SHOOTS OF TEAK, AIN, DHAWADA, AONLA, TINSA & TENDU :

6.1.12.1. The growth data for coppice shoots of different species compiled by MM Tripathi in Working Plan for East Khargon Division, Madhya Pradesh are reproduced as follows:

GROWTH DATA OF COPPICE SHOOTS OF TEAK, AIN:

Age in year	TEAK coppice quality III		AIN Quality III		AIN Quality IV a	
	Height in mt	GBH (OB) in cms	Height in mt	GBH (OB) in cms	Height in mt	GBH (OB) in cms
05	03.66	14.0	3.66	14.0	3.85	12.7
10	06.41	22.9	5.49	25.4	4.88	21.6
15	08.20	--	7.02	33.0	6.41	30.5
20	09.76	35.6	8.54	37.1	7.63	35.6
25	10.98	43.2	9.76	43.2	8.23	40.6
30	11.90	47.0	10.68	47.0	8.85	44.5
35	12.20	52.3	11.20	49.5	9.15	45.7
40	12.51	54.6	11.59	52.1	9.15	45.7
45	12.81	58.4	11.90	53.3	9.16	47.0

GROWTH DATA OF COPPICE SHOOTS OF DHAWADA, AONLA, TINSA & TENDU

Age in year	DHAWADA		AONLA		TINSA		TENDU
	Height in mt	GBH (OB) in cms	Height in mt	GBH (OB) in cms	Height in mt	GBH (OB) in cms	GBH (OB) in cms
05	3.05	08.9	1.83	06.4	1.53	3.36	17.8
10	4.27	14.0	3.36	15.2	3.05	5.19	25.4
15	4.88	17.8	4.58	22.9	4.58	6.10	27.9
20	5.49	21.6	5.80	27.9	6.10	6.41	34.8
25	6.10	26.7	6.86	34.3	6.41	7.32	43.2
30	7.31	35.6	7.63	36.8	6.71	8.54	50.8
35	8.54	40.6	8.24	39.4	7.02	9.46	54.6
40	9.46	44.5	--	--	7.02	9.46	57.2
45	9.76	47.0	--	--	--	9.76	57.2

Thus it is evident that at the age of 40 years gbh(ob) of coppice growth of teak, ain, dhawada, tinsa and tendu are 52,46,54,35,58 cms respectively.

SECTION:6. 2 : ESTIMATION OF GROWING STOCK :

6.2.1. GENERAL VOLUME TABLE :

6.2.1.1. Forest Survey of India has conducted the Forest Resources Survey of Ballarshah catchment areas during 1970-75. During this survey data for volume of felled trees of teak and miscellaneous species were collected and on the basis of which general volume equations were derived for the species for which felled tree data of at least 30 trees were available. Data of rest of the species were pooled together and one common equation was derived for them.

6.2.1.2. The following types of regression equations were tried :

$$V = a + b(D)^2 H$$

$$V/(D^2 H) = a + b/((D)^2 H)$$

$$V = a + b D^2 H + c (D^2 H)^2$$

$$\text{Log}_e V = a + b \text{log}_e D + c \text{log}_e H$$

$$V/D^2 = a + b/D^2 + c H^2$$

Where V = Volume (cubic meter under bark) upto 5 cm top over bark diameter

D= Diameter (mt) at breast height (1.37 mt from ground)

H = Height in meter.

Since the tract dealt which comes within the Ballarshah catchment of the above study, the general volume and the local volume equations derived by them are reproduced as follows :

6.2.1.3. The following general volume equations were selected taking into consideration, the standard error of the estimate, the multiple determination coefficient, applicability of the equations and meaningful interpretation of the equations for different species.

GENERAL VOLUME EQUATIONS TABLE

Sr.No.	Species	General Volume Equation
1.	Tectona grandis (59)	$\text{Log}_e V = -0.895849 + 2.048538 \text{ Log}_e D + 0.945216 \text{ Log}_e H$
2.	Terminalia alata (120)	$V/D^2 H = 0.313861 - 0.003885/D^2 H$
3.	Pterocarpus marsupium (39)	$V/D^2 H = 0.341324 - 0.006412/D^2 H$
4.	Diospyros melanoxylon (87)	$\text{Log}_e V = 0.763456 + 2.507200 \text{ log}_e D + (0.583027) \text{ log}_e H$
5.	Anogeissus latifolia (70)	$\text{Log}_e V = -0.544476 + 0.34322 D^2 H$
*6.	Phyllanthus emblica (23)	$V = 0.01244 + 1.912497 \text{ log}_e D + 1.157706 \text{ log}_e H$
7.	Lagerstroemia parviflora (44)	$\text{Log}_e V = -1.699443 + 1.912497 \text{ log}_e D + 1.157706 \text{ log}_e H$
*8.	Boswellia serrata (36)	$V/D^2 H = 0.36068 - 0.00761/D^2 H$
9.	Lannea coromandelica (33)	$V = 0.35751 D^2 H$
10.	Madhuca latifolia (35)	$V/D^2 = 0.726397 - 0.009571/D^2 + 0.311692 H$
*11.	Buchanania lanzan (30)	$V = 0.01475 + 0.29820 D^2 H$
12.	Cleistanthus collinus (75)	$V/D^2 H = 0.342201 - 0.000990/D^2 H$
13.	Rest of species (269)	$V/D^2 H = 0.329134 - 0.000044/D^2 H$

*Based on the study of Wadsa catchment adjoining to Ballarshah catchment.

Figures in brackets after the name of species denote the number of trees on which the equations are based.

6.2.1.4. On the basis of the above equations the general volume tables prepared for all above mentioned species have been given in Appendix No XIX(a).

6.2.2. LOCAL VOLUME TABLE :

6.2.2.1. Forest Survey of India, during their survey, volume of each sample tree was estimated using the general volume equation selected for a species. Taking this volume as dependent variable and the diameter at breast height (1.37 m above ground level) or its function as independent variable, the following types of regression equations were tried :

$$\begin{aligned}
 &V = a + b D \\
 &V = a + b D + c D^2 \\
 &V = a + b D^2 + c D^3 \\
 &V = a + b D^2 \\
 &V/D^2 = a + b/D^2 + c/D \\
 &V/D^2 = a + b/D + c D + d D^2 \\
 &V/D^2 = a + b/D^2 + c/D + d D \\
 &\text{Log}_e V = a + \text{Log}_e D
 \end{aligned}$$

6.2.2.2 The following local volume equations were selected for different species taking into consideration the same criteria as taken for general volume equations :

LOCAL VOLUME EQUATIONS TABLE

Sr.No	Species	General Volume Equation
1.	Tectona grandis (186)	$V/D^2 = 10.116115 + 0.074892/D^2 - 0.406473/D$
2.	Terminalia alata (411)	$\text{Log}_e V = 2.343936 + 2.616301 \text{Log}_e D$ for $D > 0.38$ m $V/D^2 = 8.204564 + 0.048532/D^2 - 1.056150/D$ for $D < 0.38$ m
3.	Pterocarpus marsupium (116)	$V/D^2 = 8.033788 + 0.028252/D^2 - 0.833643/D$
4.	Diospyros melanoxylon (350)	$\text{Log}_e V = 2.719783 + 2.843920 \text{Log} D$
5.	Anogeissus latifolia (110)	$V/D = -2.704089 + 0.145667/D + 17.465600 D$
6.	Phyllanthus emblica (49)	$V/D^2 = 5.000428 - 0.013485 / D^2$
7.	Lagerstroemia parviflora (127)	$V/D^2 = 9.629971 + 0.064660 / D^2 - 1.3741984 / D$
8.	Boswellia serrata (38)	$V/D = -2.641645 + 0.153684 / D + 15.056400 D$
9.	Lanea coromandelica (44)	$\sqrt{V} = -0.138286 + 2.729368 D$
10.	Madhuca latitolia (119) var. latifolia	$V/D^2 = 3.561089 + 0.025091 / D^2 + 0.185618 / D + 10.801390 D$
11.	Buchanania lanzan (67)	$V = -0.00767 + 0.2654 D + 1.0385 D^2 + 7.527 D^3$
12.	Cleistanthus collinus (593)	$V/D^2 = 13.579193 + 0.083169 / D^2 + 1.802430/D - 15.538660 D$
13.	Rest of species (1153)	$V/D = -0.883760 + 0.040841 / D + 7.252240 D + 1.348170 D^2$ for $D < 0.4$ mt $\sqrt{V} = 0.135764 + 2.756043 D$ for $D \geq 0.4$ mt

*Based on the study of Wadsa catchment adjoining to Ballarshah catchment.

Where V = Volume in M^3

D = DBH in metre.

Figures in brackets after the names of species denote the number of observations on which the equations for the species are based.

6.2.2.3. The local volume table for above mentioned species with the help of above regression equations was prepared during the preparation of this plan which have been given in Appendix No XIX(a).

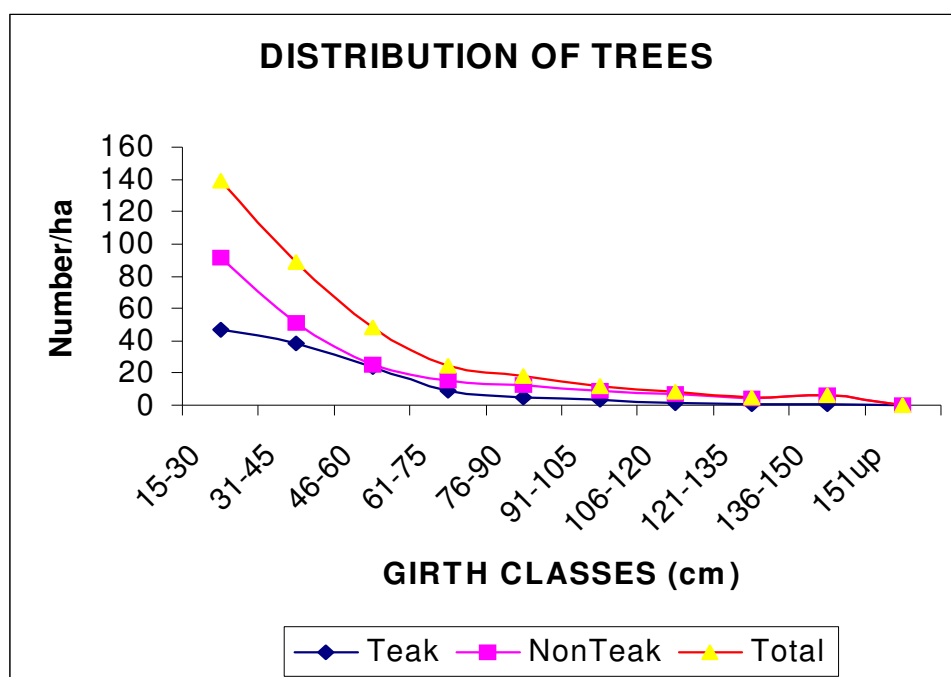
6.2.3. TREE ENUMERATION :

6.2.3.1. Under the guidance of the Conservator of Forests Working Plan, Nagpur Maharashtra State, tree enumeration for the areas having adequate tree cover was carried out by the team comprising the field staffs of Central Chanda Division and under the supervision

of Deputy Conservator of Forests, Working Plan Division, Yavatmal during 2001-2002. All the species were enumerated separately in 15 cm girth classes down to 15 cm gbh. The data analysis have been carried out with the help proprietary Software prepared by Shri J. S. Grewal IFS, Chief Conservator of Forests (Conservation) M.S. Nagpur, and report generated by that have been incorporated in Appendix No XLVIII.

6.2.3.2. ENUMERATION RESULT OF CENTRAL CHANDA DIVISION:

Girth Class	Teak	NonTeak	Total	% of Teak	% of NonTeak
15-30	47.1	91.8	138.9	34	66
31-45	38.3	50.7	89.0	43	57
46-60	23.6	24.9	48.5	49	51
61-75	9.0	15.6	24.6	37	63
76-90	5.1	12.8	17.9	28	72
91-105	3.2	9.0	12.2	26	74
106-120	1.4	6.8	8.2	17	83
121-135	0.7	3.9	4.6	15	85
136-150	0.5	6.0	6.5	8	92
151up	0.0	0.0	0.0	0	0
Total	128.9	221.7	350.4	37	63



6.2.3.3.CONVERSION WORKING CIRCLE : DHABA RANGE

Girth Class	2002 Enumeration			1972 Enumeration			Change in Composition		
	Teak	NonTeak	Total	Teak	NonTeak	Total	Teak	NonTeak	Total
15-30	47.1	91.8	138.9	46.07	53.85	99.92	1.03	37.95	38.98
31-45	38.3	50.7	89	46.3	45.11	91.41	-8	5.59	-2.41
46-60	23.6	24.9	48.5	45.92	32.39	78.31	-22.32	-7.49	-29.81
61-75	9	15.6	24.6	34.11	22.95	57.06	-25.11	-7.35	-32.46
76-90	5.1	12.8	17.9	22.52	21.36	43.88	-17.42	-8.56	-25.98
91-105	3.2	9	12.2	12.82	14.64	27.46	-9.62	-5.64	-15.26
106-120	1.4	6.8	8.2	8.06	6	14.06	-6.66	0.8	-5.86
121-135	0.7	3.9	4.6	5.36	4.87	10.23	-4.66	-0.97	-5.63
136-150	0.5	6	6.5	4.62	6.35	10.97	-4.12	-0.35	-4.47
151up	0	0	0	0	0	0	0	0	0
Total	128.9	221.7	350.4	225.78	207.52	433.3	-96.88	14.18	-82.9

6.2.3.4. COPPICE WITH RESERVE WORKING CIRCLE : BALLARSHAH AND KOTHARI RANGE

CWR CENTRAL CHANDA DIVISION : (2777.085ha 3.75% Sampling)

SrNo	Species	15-30	30-45	45-60	60-75	75-90	90-105	105-120	120-135	>135	Total
1	Ain	3.87	2.22	1.77	1.63	1.36	1.07	1.06	0.64	1.06	14.68
2	Bharati	1.69	0.85	0.05	0.00	0.01	0.00	0.00	0.01	0.03	2.64
3	Bahawa	1.02	0.22	0.10	0.03	0.02	0.01	0.01	0.01	0.01	1.42
4	Beheda	0.39	0.16	0.07	0.05	0.05	0.02	0.06	0.07	0.02	0.89
5	Bhera	2.13	1.20	1.31	0.72	0.15	0.09	0.13	0.04	0.02	5.78
6	Bija	0.10	0.01	0.00	0.02	0.01	0.01	0.00	0.00	0.01	0.16
7	Dhawada	9.88	5.08	4.21	3.54	1.97	1.15	0.71	0.32	0.34	27.20
8	Garadi	0.01	0.03	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.08
9	Hiwar	0.42	0.18	0.10	0.11	0.06	0.01	0.01	0.02	0.03	0.93
10	Kalamb	0.14	0.07	0.16	0.14	0.06	0.06	0.12	0.13	0.25	1.11
11	Khair	0.87	0.91	1.24	1.42	0.92	0.61	0.39	0.19	0.19	6.73
12	Kuda	0.95	1.11	0.94	0.53	0.20	0.10	0.07	0.01	0.01	3.91
13	Lendia	0.19	0.06	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.26
14	Mowai	0.43	0.37	0.52	0.56	0.67	0.68	0.68	0.98	0.88	5.77
15	Moha	0.82	0.42	0.23	0.17	0.22	0.23	0.27	0.35	0.81	3.52
16	Palas	1.98	1.24	0.46	0.30	0.12	0.07	0.05	0.02	0.04	4.27
17	Sehena	0.54	0.22	0.10	0.09	0.00	0.06	0.00	0.01	0.03	1.05
18	Salai	0.06	0.00	0.06	0.05	0.09	0.22	0.56	0.66	0.99	2.69
19	Tendu	2.36	0.93	0.27	0.27	0.33	0.18	0.16	0.11	0.09	4.69
20	Teak	6.47	4.98	2.90	1.82	1.16	0.61	0.49	0.30	0.18	18.92
21	Others	1.15	0.81	0.77	0.45	0.29	0.43	0.36	0.26	0.62	5.16
22	Total	35.48	21.06	15.24	11.91	7.69	5.63	5.12	4.13	5.61	111.86

Girth	2002 Enumeration	1972 Enumeration	Change in Composition
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Class	Teak	NonTeak	Total	Teak	NonTeak	Total	Teak	NonTeak	Total
15-30	21.79	85.16	106.95	3.85	110.77	114.62	17.94	-25.61	-7.67
31-45	12.48	47.05	59.53	2.79	116.98	119.77	9.69	-69.93	-60.24
46-60	5.9	29.29	35.19	1.1	53.41	54.51	4.8	-24.12	-19.32
61-75	2.71	18.41	21.12	0.64	28.31	28.95	2.07	-9.9	-7.83
76-90	0.51	15.66	16.17	0.31	17.16	17.47	0.2	-1.5	-1.3
91-105	0.19	9.95	10.14	0.12	6.25	6.37	0.07	3.7	3.77
106-120	0.08	7.84	7.92	0.08	3.31	3.39	0	4.53	4.53
121-135	0.04	4.66	4.7	0.04	2.03	2.07	0	2.63	2.63
136-150	0.1	6.89	6.99	0.02	2.08	2.1	0.08	4.81	4.89
151up	0	0.04	0.04	0	0	0	0	0.04	0.04
Total	43.8	225.26	269.06	8.95	380.3	389.25	34.85	-155.04	-120.19

**6.2.3.5. SELECTION CUM IMPROVEMENT WORKING CIRCLE:
GARLAPETH BLOCK**

Girth Class	2002 Enumeration			1982-83 to 1984-85 Enumeration			Change in Crop Composition		
	Teak	NonTeak	Total	Teak	NonTeak	Total	Teak	NonTeak	Total
15-30	2.78	66.85	69.63	1.30	49.24	50.54	1.48	17.61	19.09
31-45	2.04	42.22	44.26	1.98	45.13	47.11	0.06	-2.91	-2.85
46-60	1.30	20.64	21.94	2.70	45.29	47.99	-1.40	-24.65	-26.05
61-75	0.37	12.31	12.68	2.32	32.66	34.98	-1.95	-20.35	-22.30
76-90	0.19	7.31	7.50	1.56	19.34	20.90	-1.37	-12.03	-13.40
91-105	0.00	6.30	6.30	0.70	9.60	10.30	-0.70	-3.30	-4.00
106-120	0.09	6.20	6.29	0.47	6.67	7.14	-0.38	-0.47	-0.85
121-135	0.00	3.06	3.06	0.27	4.01	4.28	-0.27	-0.95	-1.22
136-150	0.46	7.13	7.59	0.85	11.24	12.09	-0.39	-4.11	-4.50
151up	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	7.23	172.02	179.25	12.15	223.18	235.33	-4.92	-51.16	-56.08

**6.2.3.6. SELECTION CUM IMPROVEMENT WORKING CIRCLE :
SIDDHESHWAR BLOCK:**

Girth Class	2002 Enumeration			1982-83 to 1984-85 Enumeration			Change in Crop Composition		
	Teak	NonTeak	Total	Teak	NonTeak	Total	Teak	NonTeak	Total
15-30	8.78	95.04	103.82	0.67	25.41	26.08	8.11	69.63	77.74
31-45	6.15	50.25	56.40	1.53	39.20	40.73	4.62	11.05	15.67
46-60	2.81	31.14	33.95	1.05	28.65	29.70	1.76	2.49	4.25
61-75	1.21	17.56	18.77	0.78	19.49	20.27	0.43	-1.93	-1.50
76-90	0.81	14.09	14.90	0.57	13.29	13.86	0.24	0.80	1.04
91-105	0.56	8.84	9.40	0.38	9.63	10.01	0.18	-0.79	-0.61
106-120	0.36	7.86	8.22	0.22	6.52	6.74	0.14	1.34	1.48
121-135	0.17	5.24	5.41	0.09	3.53	3.62	0.08	1.71	1.79
136-150	0.00	9.24	9.24	0.07	5.99	6.06	-0.07	3.25	3.18
151up	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.06	0.06
Total	20.85	239.32	260.17	5.36	151.71	157.07	15.49	87.61	103.10

6.2.3.7. CONVERSION WORKING CIRCLE : RAJURA BLOCK

Girth Class	2002 Enumeration			1982-83 to 1984-85 Enumeration			Change in Crop Composition		
	Teak	NonTeak	Total	Teak	NonTeak	Total	Teak	NonTeak	Total
15-30	99.49	127.18	226.67	31.71	55.76	87.47	67.78	71.42	139.20
31-45	99.96	65.28	165.24	5.87	45.58	51.45	94.09	19.70	113.79
46-60	60.05	33.12	93.17	3.50	26.78	30.28	56.55	6.34	62.89
61-75	14.83	16.52	31.35	2.01	17.71	19.72	12.82	-1.19	11.63
76-90	4.27	13.63	17.90	1.21	12.58	13.78	3.06	1.05	4.12
91-105	2.17	9.91	12.08	0.64	7.25	7.89	1.53	2.66	4.19
106-120	0.06	6.39	6.45	0.25	4.49	4.74	-0.19	1.90	1.71
121-135	0.05	2.45	2.50	0.12	4.19	4.31	-0.07	-1.74	-1.81
136-150	0.01	3.30	3.31	0.12	3.97	4.08	-0.11	-0.67	-0.77
151up	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01
Total	280.89	277.79	558.68	45.42	178.30	223.72	235.47	99.49	334.96

6.2.4.1. SAMPLING PLAN : 1% systematic line plot sampling method had been adopted for tree enumeration. 600 mt x 600 mt grid lines had been laid down on a map on 1: 50000 scale and at each point of grid sample plot of dimension 60 meter x 60 meter was taken and total enumeration of species present in the plot in 15 centimeter girth class interval was been carried out and for the regeneration 20m x 20m plot was laid to ascertain the growing stock as well as status of regeneration.

6.2.5.1. EXISTING GROWING STOCK : Working circle wise and range wise growing stock per ha have been calculated and given in Appendix XLVII.

SECTION : 6. 3 : YIELD

6.3.1. The annual out turns of respective working have been discussed in corresponding working circle prescription in part II

6.3.2. COMMERCIAL VOLUME TABLE :

6.3.2.1. Commercial volume table which is in practice in Central Chanda Forest Division, prepared by collecting data from worked coupes and given in the working plan for previous plan of Rajura Sub Division which is applicable for future yield calculation, is reproduced as below :

COMMERCIAL VOLUME TABLE

Girth Class(cm)	Timber(cum)	FireWood(cum)	Total(cum)
15-30	0.014	0.000	0.014
30-45	0.028	0.000	0.028
45-60	0.070	0.000	0.070
60-75	0.110	0.060	0.170
75-90	0.165	0.090	0.255
90-105	0.220	0.120	0.340
105-120	0.310	0.175	0.485
120-135	0.400	0.230	0.630
135-150	0.485	0.330	0.815
>150	0.570	0.430	1.000

6.3.2.2 SITE QUALITY : The site quality means the All India site quality , which implies the fell height brackets

Site quality

Top height at the age of 50 years

I	30 – 39 meter
II	24 – 30 meter
III	18 – 24 meter
IV	12 – 18 meter

CHAPTER – VII

ESTIMATE OF CAPITAL VALUE OF FORESTS IN TERMS OF TANGIBLE AND INTANGIBLE BENEFITS

SECTION:7.1. Since the market rates for timber and firewood and also the production and extraction cost is increasing year after year, attempt has not been made to find out the exact capital value of the forests in terms of rupees. However, the existing growing stock per hectare is already discussed in detail in the chapter VI.

7.1.2..IN TERMS OF INTANGIBLE BENEFITS : As the forests are depleting fast, the intangible benefits of the forests are getting more and more importance day by day. During an unique research done in the Banaras Hindu University, it is found that a single tree of about fifty years of age is worthy of:

Exhales oxygen worth	Rs. 2.50 lakh.
Inhales CO ₂	Rs. 5.00 lakh
Prevents soil erosion worth	Rs. 2.50 lakh
Regulates water supply worth	Rs. 3.00 lakh
Provides shelter to wildlife worth	Rs. 2.50 lakh
Causes synthesis of proteins worth	Rs. 0.20 lakh
Total	Rs. 15.70 Lakh

7.1.2.2. Thus from a middle aged tree we get intangible benefits worth about Rs. 15.7 lakh. It is also estimated that well stocked wood land on one hectare of area absorbs 3.7 tonnes of CO₂ from atmosphere and give about 2.5 tonnes of life sustaining oxygen.

7.1.2.3. As per the guidelines issued by the Government of India in the Ministry of Environment, Forest and Wildlife wide No.11-6/85/FRY (Cons). dt 13th January, 1986 regarding cost benefit analysis for non forest use of forest land under Forest Conservation Act, 1980, thumb rule given is as follows :

One ha of fully stocked forests (Density = 1.00)

((avoids soil erosion,

((affects hydrological cycle,

((provides wildlife habitat

((improves micro climate

((and maintains ecological balance and is of worth Rs. 126.74 lakhs over a period of 50 years. This shows the tremendous value of the forests.

CHAPTER - VIII

WILDLIFE PRESERVATION

SECTION :8.1 : GENERAL HISTORY OF WILDLIFE :

8.1.1.1. The tract dealt was home of a large number of flora and fauna both in number and varieties. The miscellaneous forests are ideal composition to harbour varieties of wildlife. Even today the tract dealt with boasts to host innumerable floral and faunal wildlife. Variety of animals and birds constituted the brilliant complex of nature in beauty of colours strongness of structure and the habit. In the past wild animals enjoyed large measures of protection owing to difficult access to the forest, which sustained and sheltered them. The food, water and shelter, the primary needs of the wild creatures were available in plenty. The religion and religious superstitions also provided a good deal of protection to the fauna. The wild animals were held in high religious esteem by the people. The ancient rulers also displayed keen interest in protection and preservation of wild animals. Ashoka's pillar edicts bear testimony to this. Wild animals received fair amount of protection during Moghal regime. In early British Rule, wild animals became the prominent source of attraction and were being treated as a source of sports and enjoyment. Doing shikar took the shape of most prestigious sports and enjoyment. Kings of other country were invited and obliged for doing shikar. People of highest status in the society started playing and enjoying with the life of other innocent creature. Killing big animals was treated as bravery and killing more such animals became the matter of pride. Compassion for wild animals in the heart of the big personality of the society, in general, lessened to the greatest extent and they used to do shikar without any consideration of nature and ecological balance. This practice went on increasing with the accessibility in forest, development of road net works, upgradation of roads, availability of adequate transport facilities. The invention of sophisticated long range and powerful weapons, blinding flash light etc. added their might to a relentless onslaught on the wild animals. All these reduced most of the wild animals to the verge of extinction. Also ban on shikar and availability of foreign market for different parts of different wild animals at very high cost, wild animals became the prey to poachers. The ever-increasing population is engulfing and disturbing the natural habitat. The magnificent national asset is fading away and wildlife certainly sinks into oblivion unless protective and conservative measures are adopted through mass education and motivation to ensure no further destruction of the fauna. The wild animal of which the tract was once proud of, are becoming the vanishing asset of the tract. However, even today these forests shelter a variety of wild animals, birds, reptiles' etc. but in very less numerical strength.

SECTION :8.2 : DISTRIBUTION OF WILD ANIMALS, BIRDS AND REPTILES

8.2.1. CARNIVORES : RARELY FOUND CARNIVORES ARE :

8.2.1.1. TIGER (*Panthera tigris*) : It is commonly known as Wagh or Sher and is found in dense forests in the plains of sheltered valleys. During summer tigers are seen in the vicinity of big rivers or water holes. This species is numerically very less in the tract.

8.2.1.2. PANTHER (*Panthera pardus*) : It is locally known as Bibta Wagh or Tendua and is found throughout the tract. Panthers pay nocturnal visits to villages situated on the fringes of forests and lift stray dogs, goats and even poultry. This animal adopts itself to varying conditions of living. The intrusion of man in its environment is responsible for reduction in its number.

8.2.1.3. Commonly seen other carnivores are Wolf (*Canis lupus*), Jackal (*Canis aureus*), ox (*Vulpes bengalensis*), Jungle cat (*Felis Chaus*).

8.2.2. Herbivores : Rarely seen herbivores are:

8.2.2.1. Indian Bison / Gaur (*Bos gaurus*) : It is locally known as gaur and is the largest animal amongst the existing bovines. Stray herds of bison are noticed.

8.2.2.2. Wild buffalo : (*Bubalus bubalis hinnacus*) : Locally known as ran bhais was in this tract but now it is not seen at all.

8.2.3. Commonly seen herbivores are:

8.2.3.1. Sambhar (*Cervus unicolour*) is the largest animal with fine horns in deer family. The forests near cultivation are favourite habitats of Sambhar. It has a keen sense of scent and hearing but moderate sight. The hind is smaller without horns. They are nocturnal in habit. Sambhar stays are mostly solitary. Hinds may be found in small herds of three or four with their calves.

8.2.3.2. Chital or Spotted deer (*Axis axis*) : They are the most beautiful of all the deer. Smooth bright coat with profuse spots adds to the beauty of chital. They prefer fringes of forests and are found in small herds.

8.2.3.3. Nilgai or blue bull (*Boselaphus trago camelus*) : Commonly known as rohi and is seen in daytime in herds in the open scrub forests. It is horse like in appearance.

8.2.3.4. Sloth bear (*Melursus ursinus*): Locally called reechh or aswal and is found in all region. This animal particularly the female with cubs attacks without any provocations.

8.2.3.5. Wild boar (*Sus scorfa*) is locally known as ran dukkar and is found all over the tract. They damage agricultural crops in the marginal and isolated fields.

8.2.3.6. Hares : (*Lapus nigricollia*): Locally known as sasa and is found all over the tract.

8.2.4. WILD BIRDS: Commonly seen birds are pea - fowl/mor (*Pavo cristatus*), Jungle fowl/Jungli murgi (*Gallus sonneratii*), Sandgrouse/ Bhat titar (*Pterocles exustus*), Grey Partridge/titar (*Francolinus pictus*), common quails/bater (*Coturnix coturnix*). Among water birds ducks and egret are commonly found in the tanks. In water bodies during winter, variety of migratory birds visit the areas.

8.2.5. VERMINS : Commonly found vermins are wild cat/ranmanjar (*Felis chaus*) and common langoor (*Presbytis antellus*).

8.2.6. REPTILES : Amongst the reptiles, various kinds of snakes are seen in the forests.

SECTION:8.3: PAST MANAGEMENT OF WILDLIFE AND ITS RESULTS :

8.3.1.1. Shooting of games in Government forests was regulated by the shooting rules framed by the then Central Province and Berar Government under Wild Birds and Wild Animals Protection Act of 1887 which was later on replaced by the Wild Animals and Birds Protection Act of 1912. The rules were given in details in Appendix - VII of the forest Manual Vol.II of the then Madhya Pradesh.

8.3.1.2. Management of wildlife was given special attention particularly after 1935. Shooting was permitted in the areas living abundant wildlife and areas deficient in wildlife were closed for shooting. Shooting permits granted under this system specified the kind and number of animals to be shot. The shooting blocks after hunting of permissible limit of game animals was given rest by closing the same for hunting for 1 to 3 years. Initially restrictions on number and size of meat animals i.e. deer and antelopes to be shot on individual permit were imposed. Carnivores however, were allowed to be shot without any limit. This resulted in indiscriminate shooting of tigers and other game animals.

8.3.1.3. Management of wildlife was regulated under the provisions of Indian Forest Act 1927 and rules framed by the then Government of Central Province and Berar Game Act of 1935 during the initial period of Dashputre's Plan . With the reorganisation of states in 1956 and subsequent formation of Maharashtra state , Mumbai, Wild Animals and Wild Birds Protection Act, 1960 was made to operate with effect from 1.6.1961 for these forests.

8.3.1.4. In fact in the past in the name of wildlife management regulation of shooting and issuing of shooting permits were done till the ban on shooting other than this nothing has been done for conservation and development of wildlife in the past in this tract.

8.3.1.5. Since management of wildlife was not done what would be results. Due to not having any management, wildlife has reached to the verge of disappearance. The condition

of naturally existing, basic needs (food, water and shelter) have deteriorated sharply and to maintain and develop them nothing has been done substantially so far.

SECTION :8.4 : LEGAL PROVISION FOR WILDLIFE PROTECTION :

8.4.1.1.The provisions in Hyderabad and Berar Forest Law, 1886 passed on 22nd Oct,1886. No separate Act about the wildlife was in vogue at that time. However, under section 3, sub rule (7), the definition of the forest produce included skins, tusks, bones and horns”. Under section (8) of the said Act, “any person who acts in contravention of the said Act in the State Forests was punishable with the fine which may go upto fifty rupees or when the damage resulting from this offence amounts to more than twenty five rupees, to double the amount of such damage.” Under section 10, sub section (4) of the said Act “the residency by orders may regulate any part of the State Forests for the hunting, shooting, fishing, poisoning water and setting trap or snares.”

8.4.1.2.The Berar Law, 1886 was amended by the Berar Forest Law. Here the scope of the Act was extended. The section 7(b) states that forest produce includes the following when found in, or brought from a forest, that is, to say :- Wild animals, skins, tusks, horns, bones, silkcocoons, honey and wax and all other parts or produce of animals or forest produce. Section 7 (2) (b) states that any one who hunts, shoots, fishes, poisons waters or sets traps or snares, shall be punishable with the fine which may extend upto fifty rupees or when the damage resulting from the offence amounts to more than twenty five rupees to double the amount of such damage. The section 10(4)(iii) empowered the resident to frame the rules regarding regulation of hunting, shooting, fishing, poisoning water and setting traps and snares.

8.4.1.3.In the year 1911, vide Notification No.G.I.F.D.No. 2197-1-B, dated 13th Oct,1911 the Indian Forests Act, 1878 was made applicable. The section 2(b)(iii) included the wildlife in its definition of the forest produce. Under the section 25(i) of the said Act, any person in contravention of any rules which the local Government may time to time prescribe, kills or catches elephants, hunts, shoots, fishes, poisons water or sets traps or snares shall be punishable with imprisonment for a term which may extend to six months or with fine not exceeding five hundred rupees, or with both, in addition to such compensation for damage done to the forest as the convicting court may direct to be paid.

8.4.1.4. Prior to reorganisation of states, the wildlife conservation in this part was through the implementation of the provisions of the Indian Forest Act, 1927, and the shooting rules framed under section 26(i) and 76(d) by Ex Madhya Pradesh Government as given in Appendix VII of M.P.Forest Manual, Volume II, combined with Wild Birds and Animals Protection Act 1912 as amended by the Central Provinces Amendment Act of 1935. From 1927, shooting blocks system was started. Under this system, the Conservator of Forests in consultation with the Divisional Forest Officer used to declare certain blocks of Reserved Forests with abundant games as open for shooting. The Divisional Forest Officer used permits for shooting.

8.4.1.5. The Mumbai Wild Animals and Wild Birds Protection Act, 1951, for the protection of wildlife, was extended to Vidarbha region with effect from 1.6.1961. Though this Act did not propose a significant change in the management of game in Reserved and Protected Forests, yet it was important as it operated in areas out side Reserved and Protected Forests also. Under the provisions of this Act, arms liecnce holders for sports were to register themselves with the wildlife preservation officer. This Act prescribed a closed season for hunting and classified games into four categories viz small game, big game, special big game and pet animals. It also sought to control transaction in trophies and other wildlife produce. The statutory Wildlife Advisory Board was constituted under this Act to advise the Government on various important matters concerning wildlife.

8.4.1.6.The Indian Board of Wildlife, was constituted in 1952 with the main object of devising ways and means for Conservation of wildlife through coordinated legislative and

practical measures and sponsoring the setting up of National Parks and Wildlife Sanctuaries. A comprehensive and unified National and State Park Act, 1971 was passed which provided for appointment of any Advisory Committee to advise in constitution and declaration of National Parks and sanctuaries and formulation of administrative policy. The Parliament then enacted the Wildlife (Protection) Act, 1972, which came into force in the State of Maharashtra with effect from 1st June, 1973. From the commencement of this Act, every other Act relating to any matter, contained in this act, and in force in the State stood repealed. The subsequent rules made under the Act are as follows :

The Wildlife (Stock Declaration) Rules 1973 (became effective in Maharashtra with effect from 1.6.1973.)

(ii) The Wildlife (Transactions and Taxidermy) Rules, 1973 (became effective in Maharashtra with effect from 1.6.1973.)

The Wildlife (Protection) Rules, 1975 (became effective from 6.3.1975)

The Wildlife (Protection) Licensing (Additional matters for consideration) Rules, 1983 (became effective w.e.f. 13/4/1983).

8.4.1.7. The Wildlife (Protection) Act, 1972 is a piece of comprehensive legislation which provides for effective measures of protection and preservation of wildlife, restriction on hunting and regulation of trade in wild animal articles. Hunting of wild animals is strictly prohibited under this Act unless it is specially permitted. Wild animals have been categorised in five schedules and animals included in schedule-I and part II of schedule- II received the privilege of strict protection. Animals specified in these schedules are permitted to be hunted with special permission, if animal in schedule - I has become dangerous to human life or property, and animal in schedule - II has become so disabled or diseased as beyond recovery. Animals specified in schedule II (Part-I), III & IV were prohibited from hunting, except under and in accordance with specific licence issued under that Act or it had become dangerous to human life or property or had become diseased or disabled beyond recovery. Only vermin included in schedule-V had been excluded from strict protection. Hunting of young female of any wild animal other than vermin or any deer with antlers in velvet is strictly prohibited unless specially permitted (Section - 15). The Act specifically requires declaration to be furnished by the individuals regarding trophies etc. in their control, custody or possession. Government of India, vide letter dated 18-9-1975 stated that the control over tanks and rivers in National Parks and Sanctuaries should be vested with management authorities and not with the fisheries or irrigation department.

8.4.1.8. Government of India, vide letter No. E-11011/3/75FRY9(WLF), has clarified that the certificate of legal procurement to be issued by the Chief Wildlife Warden is not necessary where an animal is not included in any schedule of the Wildlife (Protection) Act, 1972. Its export have been regulated by the Ministry of Commerce. Subsequently, the delegation of power and duties of the Chief Wildlife Warden to the Police Sub-Inspector for the purpose of section 41(1) and section 55 of the Wildlife (Protection) Act, 1972 was granted by Government Resolution No. WLP-1973/197578-FI, date 5th April, 1976. The schedules are revised by the Government on and off as it was required under section 61 of the Wildlife (Protection) Act, 1972. The Government of Maharashtra, under section 64 of the Wildlife (Protection) Act, 1972 framed rules vide letter No. WLP-1679/95507/F-5. These rules were amended further by the Wildlife (Protection) Maharashtra Rules, 1975. The wildlife Protection Act was again amended to be called as Wildlife (Protection) Amendment Act, 1986 and it came into force from 25th Nov, 1986.

8.4.1.9. Under Section 44 of the Wildlife (Protection) Act, 1972, the Government vide letter No. WLP/1682/100208/CR-43(1)/F-5 permitted the mapping of cobra and Russell vipers by a licenced dealer for the purpose of extracting venom. Under the power conferred under sub section (1) and sub section (2) of the section 64, the Government of India vide letter No. WLP 1682/10020(iii)/F-5 framed the new rules called Wildlife (Frog Leg Industry) Rules, 1987,

and it came into force from 25th Nov, 1987. The Government of India vide Letter No. F-No.-2/91/WL/1, dated 21st Oct, 1991, further amended the Wildlife (Protection) Act, 1972. The following are the important amendments.

The plants have also been included under the purview of this Act.

The zoo and circus have been defined and included under this Act.

The game reserves have been dropped.

Section 9 of Wildlife (Protection) Act, 1972 has been amended and there is a total prohibition of hunting of animals specified in schedule I, II, III & IV, except as provided under section 11 and 12.

8.4.1.10. The following are restrictions on hunting as per section 17 of Wildlife (P) Act, 1972. The following acts are prohibited, i.e.

Hunting any wild animal, from or by means of a wheeled or mechanically propelled vehicle on water or land or by aircraft;

Use of mechanically propelled vehicle for the purpose of driving or stampeding any wild animals;

Use of chemicals, explosive, pitfalls, poisons, poisoned weapons, snares or traps, except in as far as these relate to the capture of wild animals under a Wild Animals Trapping Licence;

Hunting of special game or big game other than with a rifle, unless specially authorised by the licence;

Setting a fire to vegetation for the purpose of hunting.

Using artificial light for the purpose of hunting, except when specially authorised to do so under a licence in the case of carnivore over a kill;

7) Hunting during night, except when specially authorised;

Hunting any wild animals on water holes or a salt-lick or other drinking places or on path or approaches to the same, except water-birds and sand-grouse;

Hunting any wild animal on any land not owned by Government without the consent of the owner, or his agent or lawful occupier or such claim;

Hunting during closed period as per section 16;

Hunting with the help of dogs, any wild animal except water-bird, chakor, partridge or quail.

8.4.1.11. In 1991, the Government of India has passed the Wildlife (Protection) Amendment Act, 1991, which came into force with effect from October 2, 1991, extended the Section 35 A, 44 (ii), 55(c), Chapter IIIA and Chapter IVA. The salient features of this amended Act in brief are as follows:

The words “game reserves, big game and small game” have been omitted from the Act.

Hunting the wild animals specified in Schedule I, II, III and IV of the Act has been banned, except as per the provisions of section 11.

A new chapter III-A has been introduced for the protection of specified plants. The specified plants have been included in a new schedule.

Section 29 of the Act has been amended and like National Parks no wildlife can be exploited or removed from a sanctuary too. This means all concentrated felling and collection of minor forest produce from sanctuaries would be stopped.

A new section has been added in the Act which provides that no new arm licences shall be issued within 10 km. of a sanctuary without prior concurrence of the Chief Wildlife Warden of the state.

A ban has been imposed on dealing the imported ivory and articles made therefrom.

A new chapter, IVA has been introduced to provide for central Zoo Authority and recognition of zoos.

The penalties for wildlife offences have been enhanced substantially. Section 39 of

the Act has been amended to the effect that vehicles, vessels, weapons, tools and traps that have been used for committing an offence and have seized shall become the property of the Government.

Section 61 (I) of the Act has been amended and now the power to make any change in the schedules of the Act vests only with the Central Government.

SECTION:8. 5 : RIGHTS AND CONCESSIONS :

8.5.1.1. No rights and /or privileges are granted to any person over wildlife. But a number of schedule tribe can subject to the provisions of Chapter IV of Wildlife Protection Act, pick, collect or possess in the district he resides any specified plants or plant derivative thereof for his bonafide personal use. However, permits can be granted by the Chief Wildlife Warden with prior approval of the State Government for the Special purpose of education, scientific research and collection of specimen for recognised zoos, museums and similar institutions.

SECTION:8. 6 : INJURIES TO WILDLIFE :

8.6.1. The following agents are mainly responsible for injuries to wildlife.

8.6.1.1. POACHING/SHIKAR : Shikar is completely banned. Illicit hunting are in practice. In recent period some cases were detected by the department with enthusiastic efforts of the Deputy Conservator of Forests and other staff of the Central Chanda Division. Presently this is the main cause of threat to the wildlife. It is believed that poaching is performed by using snares, traps, poisoning or by using powerful and modern weapons.

8.6.1.2. FIRE : The entire forest area is susceptible to forest fire. Almost every year most of forest is subjected to some sort of fire with varying effect to damage to flora and fauna. Some areas might be exception to it but the remote areas which are the ideal habitat burns annually. The forest fire damages the natural habitat and drives animals towards human habitation to take shelter and thereby they become easy prey to poachers and local villagers.

8.6.1.3. WATER : Most of the streams, except a few big rivers, becomes dry during summer. Therefore, animals had to visit only a few available water holes. This fact makes the villagers and poachers easy to kill the wild animals.

DISEASES: A stray incidence of foot and mouth diseases amongst bison is occasionally noticed. In other animals injury or death due to diseases is not reported though it might be occurring. More research and monitoring works are needed in this regard.

SECTION :8.7 : OTHER MEASURES ADOPTED AND EFFORTS MADE FOR PROTECTING WILDLIFE.

8.7.1. Besides the legal provisions under the Wildlife Protection Act, 1972, amended from time to time and the various rules made there under, following measures have been taken to protect the wildlife :

8.7.1.1. Compensation is paid to the owner whose cattle is killed by a tiger in the forest areas as per the provisions contained in Government Resolution No. WLP/1570/224482-X-II, dated 30/09/1971, No. MSC-1075/113554/F-1, dated 25/03/1977 and No. WLP/1579/6200/4/F-1, dated 29.05.1979. This provision was extended to the cattle killed by panther also and the killing by tiger or panther outside the forest areas also was included vide Government Resolution No. WLP/1581/116974/F-5 dated 22.08.1984.

8.7.1.2. Provision has been made for compensation in case of death or injury to human life by wild animals vide Government Resolution. No. WLP/1679/105651/CR-6/F-5, dated 27.11.1986. The maximum amount of compensation in case of death is Rs. 5000/- and in case injury Rs. 2000/-. As per Government Resolution WLP/1090/CN-285/F-5, dated 17.6.1992, the compensation in case of death or permanent disability has been increased to Rs. 40,000/- in case of person supporting the family and to Rs. 20,000/- in case of minor. In case of serious injury the compensation is Rs. 6650/- and in case of minor injury it is Rs. 1000/- per injured person.

8.7.1.3. In 1972, with a view to check illicit shooting of wild animals, the State Government sanctioned the grant of reward to the informants in respect of unlicensed shooting provided

that the information is found to be valid and leads to the conviction of the offender. In addition, the State Government has decided to sanction the rewards equal to 50% of the compensation actually recovered from the offender for illicit shooting to the Gram Panchayat or its office bearers or individuals who render cooperation in detecting such illicit shooting.

8.7.1.4. Besides, the ever mentioned legal provisions for protection of wildlife, public awareness for protection and preservation of wildlife is created through the celebration of wildlife week from 2nd October every year since 1951.

8.7.1.5. Under the purview of the aforesaid Acts Rules and G.R.'s, the efforts made for booking offences have been given in Appendix VII.

8.7.1.6. The details of cattle lifting, injuring and killing of human being within this tract have been given in Volume II.

DRAFT WORKING PLAN REPORT
CENTRAL CHANDA FOREST DIVISION

PART - II

FUTURE MANAGEMENT DISCUSSED

AND

PRESCRIBED.

CHAPTER-I

BASIS OF PROPOSALS

SECTION: 1.1 : NATIONAL FOREST POLICY :

1.1.1.1. Indian Forest Policy was first enunciated by the British Crown in the year 1894 by the Resolution No.22-F, dated October 19, 1894. After Independence First National Forest Policy was formulated by the Government of India by its Resolution No. (Agri) 13/52-F, dated 12th May, 1952. Latest National Forests Policy was passed by Ministry of Environment and Forest by its Resolution No.3-1/86-FP, dated 7th December, 1988. The changes in the policy were made as per the prevalent national needs and public requirements, both of local and general. The abstracts of the above national forest policies of India are given as follows:

1.1.2.FOREST POLICY 1894 FOR INDIA :

1.1.2.1. The general forest policy was enunciated in the year 1894, by the Government of India vide Resolution No. 22-F, dated 19th October, 1894. As per tenets of that policy the forests were to be administered solely for the public benefit, both local and general. The outstanding principles of this policy were as under:

- i) The preservation of climatic and physical conditions of the country was the foremost.
- ii) The preservation of minimum amount of forest, necessary for the general well being of the country, was second to above.

On fulfillment of the above two conditions, the other priorities were as under:

- (i) Cultivation to be given priority over forestry,
- (ii) Satisfaction of the needs of the local people free or at non competitive rates to be given priority over revenue and
- (iii) After satisfying the above requirements, the realisation of revenue to the greatest possible extent was to be considered.

1.1.3.NATIONAL FOREST POLICY OF 1952 :

1.1.3.1. Since the enunciation of 1894 policy, considerable development of far reaching importance had taken place in the economic and political fields. The part played by forests in maintaining the physical conditions of the country came to be better understood. The country had passed through two world wars, which disclosed unsuspected dependence of defence on forests. The reconstruction schemes, such as river valley projects, development of industries and communications, lean heavily on forest produce.

1.1.3.2. Taking into consideration the changes which took place in the physical, economic and political fields during the intervening period, the forest policy, was reoriented in 1952, vide Government of India in Food & Agriculture, Resolution No. (Agri) 13/52, dated 13/5/1952. It was based on six paramount needs of the country, namely :

- (i) The need for evolving a system of balanced and complementary land use, under which each type of land is allotted to that form of use under which it would produce most and deteriorate least.
- (ii) The need for checking:
 - (a) Denudation of mountainous regions, on which depends the perennial water supply of the river system whose basins constitute the fertile core of the country.
 - (b) The erosion that is progressing with a pace along the treeless banks of the great rivers leading to ravine formation and on vast stretches of undulating wastelands depriving the adjoining fields of their fertility.
- (iii) The need for establishing tree lands, wherever possible for the amelioration of physical and climatic conditions, promoting the general well-being of the people.
- (iv) The need for ensuring progressively increasing supplies of grazing, small wood for agricultural implements and in particular of firewood to replace the cattle dung for manure to step up food production.
- (v) The need for sustained supply of timber and other forest produce.

(vi) The need for the realisation of the maximum annual revenue in perpetuity, consistent with the fulfilment of the needs enumerated above.

1.1.3.3. The National Forest Policy further stated that while observing these general principles, in paramount National interest the discretion of the State Government to regulate the details of forest administration in their respective territories is left unfettered to enable them to frame their policies and legislation for conserving and utilising the forest resources. Provided that the declared forest policy of a state does not impinge adversely upon the general economy and physical balance of an adjoining State and that it is in consonance with the general principles underlying the forest policy laid down by the Center for preservation and development of the nations forest resources which are so vital to its general well-being.

1.1.4 NATIONAL FOREST POLICY OF 1988:

1.1.4.1. Indian Constitution in its original version enshrined Forest in State List. As per 42nd Constitutional Amendment Forest has been placed under Concurrent List. So Center has greater stake in preservation of forests and Environment. Over the years, forests in the country suffered serious depletion because of relentless pressures arising from ever increasing demand for firewood, fodder and timber; in adequacy of protection measures, diversion of forest lands to non-forestry uses without ensuring compensatory afforestation and essential environmental safeguards and the tendency to look upon forests as revenue earning resources. With a view to mitigate the above problems a new Forest Conservation Policy based on preservation, maintenance, sustainable utilization, restoration and enhancement of the natural environment, was enunciated in December, 1988.

1.1.4.2. The basic objectives governing the National Forest Policy of 1988 are as under:

- (i) Maintenance of environmental stability through preservation and where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of the forests of the country.
- (ii) Conserving the National heritage of the country by preserving the remaining natural forests with vast variety of flora and fauna, which represent the remarkable biological diversity and genetic resources of the country.
- (iii) Checking soil erosion and denudation in the catchment areas of rivers, lakes and reservoirs in the interest of soil and water conservation, for mitigating floods and droughts and for retardation of siltation of reservoirs.
- (iv) Increasing substantially the forest/tree cover in the country through massive afforestation and soil conservation programmes, especially on all denuded, degraded and productive lands.
- (v) Meeting the requirements of firewood, fodder, minor forest produce and small timber of the rural and tribal population.
- (vi) Increasing the productivity of forests to meet essential national needs.
- (vi) Encouraging efficient utilization of forest produce and maximizing substitution of wood.
- (vii) Creating a massive people's movement with the involvement of women, for achieving these objectives and to minimize pressure on existing forests.

1.1.4.3. The forest policy further states that in the management of the existing forests and forest lands the emphasis should be on protection, improving their productivity, conservation of total biological diversity by strengthening the network of National Parks, Sanctuaries, Biosphere Reserves and other Protected Areas, providing sufficient fodder, fuel and pasture in areas adjoining forest, to prevent their depletion and protecting, improving and enhancing the production of minor forest produce which provides sustenance to tribal population. The other important features governing the management of the forests are as under:

- (i) Severe restriction on schemes and projects, which interfere with forests that, clothe steep slopes, catchment of rivers, lakes and reservoirs.
- (ii) Noworking of forests without the Center Government having approved the management/ working plan.
- (iii) Non – introduction of exotic species without long term scientific trials.
- (iv) The rights and concessions, including grazing, to always remain related to the carrying capacity of forests.
- (v) Rights and Concessions which cannot be met from the forests to be met by development of social forestry.
- (vi) The rights and concessions enjoyed by the tribal should be protected. Their domestic requirements of firewood, fodder, minor forest produce and construction timber should be the first charge.
- (vii) Forest management/ working plan to take special care of the needs of wildlife conservation.
- (viii) Effective action to be taken to prevent encroachments on the forestland and not to regularize the existing encroachments.
- (ix) Forest based industries to raise the raw material needed by them themselves in arrangement with the private cultivators.
- (x) Survey of forest resources to be completed on scientific lines for updating information.

1.1.4.4. This National Forest Policy states “Forest should not be looked as a source of revenue, but as a national asset to be protected and enhanced for the well-being of the people and the nation.” This Policy clearly states, “The people will be actively involved in programmes of protection, conservation and management of the forests.” The document further states that non-timber forest products, “should be protected and improved and their production enhanced” to generate employment and income for the forest dwelling communities.

1.1.4.5. In June 1990, the Government of India passed a significant national resolution providing more specific guidelines regarding the formation, functioning, rights and responsibilities of the community forest management groups. It specifies the sharing arrangements in which village forest committees “successfully protect the forests, may be given a portion of the proceeds from the sale of trees when they mature, as well as non-timber forest products for subsistence use”. This policy clearly directs that forests be managed first as an ecological necessity, second as a source of goods for local populations and only third as a source of wood for industries and other non-local consumers.

SECTION :1. 2: CLASSIFICATION OF FORESTS :

1.2.1. The broad and general principles for the classification of forests is embodied in the State Government vide R & FD Resolution no. MEP-1365/132211-Y, dated December 6, 1968. Taking the above principles into consideration, the forests of the state are to be classified and managed as follows:

- (i) Protection Forests,
- (ii) Tree Forests,
- (iii) Minor Forests,
- (iv) Pasture Lands and
- (v) Miscellaneous Forests.

1.2.1.1. PROTECTION FORESTS: This includes forests which occur on very steep slope $\geq 25^\circ$ (25 degree and over) or along river banks, and forests that have become depleted through maltreatment, and further harvesting of which will accelerate soil erosion and adversely affect the productivity of agricultural lands in the lower regions. The management should be aimed at rapidly conserving these forests so that they may once again exert their beneficial influence on the soil, the water regime and the physical and climatic factors of the locality.

1.2.1.2. TREE FORESTS: This includes forests which are situated in remote tracts that are prominently suited for growing large sized timber and other products of commercial value.

1.2.1.3. MINOR FORESTS: This includes forests that are interspersed with cultivated lands and are capable for producing small timber and firewood and providing grazing, which are the indispensable needs of the adjoining agricultural population.

1.2.1.4. PASTURE LANDS: These are open forests or scrub lands that have ceased to yield even small timber but which are conveniently situated for providing grazing to the cattle used on agricultural works.

1.2.1.5. MISCELLANEOUS FORESTS: These include:

a) **GRASS RESERVES:** These are small blocks of forests situated almost intensively tracts carrying scrubby growth and capable of producing good fodder grasses which are in short supply.

b) Remaining areas which are needed for other purpose.

1.2.2.CLASSIFICATION : On the above functional basis forests of the tract dealt with are classified as under :

CLASSIFICATION OF FORESTS

SrNo	Class of Forest	Area in Ha			Total area in ha	% of total area
		RF	PF	UF		
1	Tree Forest	42616.582	830.90	5357.93	48805.412	43%
2	Minor Forest	10185.530	12801.80	201.31	23188.64	20%
3	Miscellaneous	36060.630	6014.497	240.22	42315.347	37%
	Total	88862.742	19647.197	5799.46	114309.399	100%

Miscellaneous forests contain protection forest too. Small and scattered patches of protection forests which are interspersed with the other forests have been included in respective working circles for the area and separate prescriptions to treat them have been given for them in respective Working Circles.

SECTION:1. 3 : FACTORS INFLUENCING THE GENERAL OBJECTS OF MANAGEMENT :

1.3.1.1. The National Forest Policy, 1988 is the guiding principles to decide the general objects of management. This policy recognises the services rendered by the forest to all living creatures. The services (indirect benefits) given to the society by the forest through its existence are indispensable and have more weightage than physical benefits in terms of timber and firewood coming from felling of trees. The existence of life on any planet simply can not be imagined without the existence of the vegetation. Therefore, taking out direct benefits from the forests can not be the primary objectives of the forest management. However, the direct benefit will also come through operations required to maintain the forests in healthiest conditions. On achieving these conditions of the forests, automatically both direct and indirect benefits will be optimum. Thus the orientation of the management is to have first the forest in balance and healthiest condition so as to have optimum perpetual benefits from it.

1.3.1.2. So far we followed the path and policy of management decided by the British Administration, whose main objective was to have maximum revenue. The basics of management were side tracked. The basic principle of management is to use the interest while maintaining principal intact. The optimum level of balanced stocking in any site is the principal; however, this could not be quantified. Without its quantification it is not possible to identify interest and distinguish interest from principal.

1.3.1.3. Forest with balanced distribution of age classes is called normal forest. In such a state of forest, there is a balanced movement of stems from lowest to the highest girth classes in a very natural way. This is the ultimate state of the forest, which is to be achieved and maintained.

1.3.1.4. The distribution of the number of stems/ha in different girth classes forms a structure of the forest. In a normal forest this structure is inverse J-shaped curve. With reference to this structure we can have an attempt to achieve that structure which should be the ultimate goal.

1.3.1.5. Forest crop is a dynamic biological entity, which keeps on changing and putting on increment. The rate of increment depends on the site quality, age, species and stocking of the individual entity in the crop. The optimum stocking varies with age of the crop and corresponds to maximum increment. In an all aged crop, optimum stocking implies the balanced distribution of stems of all ages. Total increment falls off as the stocking changes from the optimum level.

1.3.1.6. The main object of management is to obtain an optimum level of stocking and to extract the optimum increment periodically, on a sustained basis, without harming the future crop. Thus there are two aspects of the management:

(i) To visualize the ideal state of the forest i.e. optimum stocking, distribution of stems and species in different age classes etc.

(ii) To devise means to take out optimum increment periodically, without disturbing the future crop.

The achievement of what is desired of is the essence of any scientific management system

1.3.1.7. The achievement of goal corresponds to the state of optimum production. However, this optimum production is in terms of quantity of the species existing in the crop. To optimise the production in both in terms of quality and quantity, modification in crop composition is needed. The change in composition of the crop can be brought about in two steps:

(A) In first step, crop composition should be improved by way of giving preferential treatment, in the existing crop while carrying out silvicultural operations. However, this cannot bring the crop composition to the desired level because of the two limitations:

(i) Fixed number of seedlings of preferred species in the existing crop, that number cannot be assessed and

(ii) The number of stems surplus in that girth class against which preference is to be given to the desired species cannot be assessed. That it is unknown to us the exact number of stems of a particular species at a given point of time to have the optimal composition.

(B) In the second step, if the existing seedlings of preferred species are less than the desired numbers, gap plantings of those species in required number should be initiated. The experiment of gap planting should be started with only one or two silviculturally suitable species. For this local valuable species should be preferred. On getting success, the number of species may be increased upto desired level. After introduction, the principle of preferential treatment should be kept on applying to maintain them.

1.3.1.8. The tribal people, being the part and parcel of the forest, their welfare should have one of the considerations of the management. The management of non wood and medicinal forest produce on scientific lines has the direct bearing with the welfare of the tribal and local villagers and therefore, this aspect is to be taken into consideration.

SECTION: 1.4: GENERAL OBJECTS OF PRESENT MANAGEMENT:

1.4.1.1. On the basis of National Forest Policy 1988, points discussed above and experience gathered on past management practices as discussed in Chapter V in part I of this plan, the general objects of management decided are as follows:

(i) As far as possible to bring normalcy in the forest.

(ii) To preserve forest cover on steep slopes, along nala banks and water courses to check soil erosion and to preserve site and environment.

(iii) To meet the requirement for small timber, firewood, fodder and non-wood and medicinal forest produce of the local population on top priority.

(v) Consistent with above objectives, to produce large sized timber on sustained yield basis.

(v) To take up activities aiming at welfare of the tribal and local villages and thereby to increase the production of non wood and medicinal forest produce and to manage the same scientifically to utilize the potential to the optimum possible extent on sustained yield basis.

(vi) To take up measures to protect, develop and conserve wild animals in this tract.

SECTION: 1. 5: METHODS OF TREATMENT TO BE ADOPTED:

1.5.1.1. National Forest Policies have laid down the emphasis on conservation of biodiversity and meeting the demands of local people. Accordingly, the objects of management of the forests have been fixed. To achieve these objectives of the management comprehensive approach has been adopted in the management of the forests. For the conservation of biodiversity and the site, soil and moisture conservation works will be taken. These works will be conducive to watershed development and for that sequencing of coupes will be from ridge to valley. Natural regeneration will be preferred over the artificial regeneration, in areas where it is adequate. Suitable soil working and tending operations will be carried out to stimulate and enhance the growth of naturally regenerated seedlings. To meet the local demand of the people, an assessment of their requirements will be made by the executive machinery and efforts will be taken to meet these requirements to the possible extent. Active participation and involvement of local people in protection, regeneration and development of forests will be sought for through participatory forest protection and joint forest management. Special emphasis on protection of forests from fire, grazing and illicit cutting will be given.

1.5.1.2. Tract dealt with contains mainly tree forests, minor and miscellaneous forests. Protection forests, being interspersed with protection, cultivation in form of encroachment have been clubbed with miscellaneous forests. Some areas of “Zudpi Jungle” or private land have been taken over by the Department under compensatory afforestation scheme has been shown under miscellaneous forests. Protected Forests included in this plan has been shown under respective category depending upon their structure. Taking into consideration the above aspects besides the growing stock and condition of the site has made the functional classification of forests. The various types of forests will be treated as follows:

1.5.2.1. PROTECTION FORESTS: Most of these areas lie along the steep slopes of Manickgarh hills, Garlapeth, Siddheshwar and other hillocks, along the nala banks, along the river banks and other water bodies and are found in continuity or scattered. They will be treated under the category 'A' of the respective coupe in each working circle. No felling of trees is prescribed in these areas. Soil and Moisture Conservation works will be taken up with artificial regeneration with seed sowing on the bunds created for that.

1.5.2.2. TREE FORESTS : These forests are mainly of better quality, timber producing and less prone to erosion. They belong to all India Teak and Mixed Site qualities II , II/III, III, III/IV, and IV. The trees are generally straight boled These forests have been being managed on commercial lines which has affected the status of natural regeneration. Establishment of naturally regenerated seedlings in such forests are of varying proportions: great successes to dismal successes. These areas are required to be developed and maintained as rich and healthy normal forests. The management prescriptions will be as per the site quality and it will be oriented to give more importance to Cut Back Operations, Cleaning, Thinning etc. silvicultural operations along with extraction of silviculturally available material ensuring eternal future crop. Therefore, during this plan period Selection Cum Improvement or Treatment for Old Plantation have been prescribed for betterment of hygiene of natural or plantation forest respectively and meeting the requirement of the population.

1.5.2.3. MINOR FORESTS : These forests are comparatively of low quality and badly treated in the past by prescribing inappropriate silvicultural system, which has reduced the proportion of valuable and important trees in the crop. They were worked under Coppice With Reserve in Khisti's plan period and Afforestation Working Circle under Dr. Nand Kishor's plan. Crop is young with scattered middle aged and rare mature and over mature

trees. Mature trees, which are rarely seen, are mainly fruit trees species, which had been selected as reserve for long time. Among such species, moha is prominent. The regeneration status of some of miscellaneous species is very good in the areas, which are away from villages and where grazing and firewood pressure is comparatively less. Basically, the area is highly capable to be regenerated naturally. However, due to excessive grazing, weed growth and repeated fire some parts have become incapable to be regenerated naturally. These forests are also to be managed to bring normalcy in them. Since forests are badly disturbed and so during this plan period only appropriate silvicultural operations at an appropriate intervals has been prescribed. Special thoughts and measures have been prescribed to solve the problems of grazing and fire, which are main hurdles in the way of achieving normalcy.

1.5.2.4. MISCELLANEOUS FORESTS: Mainly protected forests of Ballarshah, Kothari, and Dhaba forest ranges of this division, newly acquired Reserved Forests of Rajura Sub Division of this division and “Zudupi Jungle” taken for compensatory afforestation have been included in this type of forests. These types of forests have been taken for scientific management for the first time in this plan. Also the area of earstwhile Rajura Sub Division which are under encroachment for cultivation or for mere possession where the forestry operation taken by the department are vehemently opposed by the villagers has been brought under this category. By and large these areas are open and highly prone to encroachment. Survey and Demarcation of areas by RCC Pillars as per the direction given by Office of Principal Chief Conservator of Forests, Maharashtra State vide his Letter No 68 dated 29.5.2001(Marathi) and people participation in the form of Joint Forest Management will be actively sought in the management of these forests.

1.5.2.5. OTHER FORESTS: Under this category “Zudupi Jungle” taken over by this division has been included. In these areas survey and demarcation of the areas will be first priority. Since the areas are mostly open and under tremendous pressure of biotic interference due proximity to habitation and age old practices of free grazing or use as camping ground for local cattle, the vegetation cover is sparse or dismal. Afforestation is to be taken. Besides these to develop the areas under forests cover soil and moisture conservation works will be emphasized. The functioned classification is given below:

Sr. No	Class of Forest	Area in Ha			Total area in ha	% of total area
		RF	PF	UF		
1	Tree Forest	42616.582	830.90	5357.93	48805.412	43%
2	Minor Forest	10185.530	12801.80	201.31	23188.64	20%
3	Miscellaneous Forest	36060.630	6014.497	240.22	42315.347	37%
	Total	88862.742	19647.197	5799.46	114309.399	100%

SECTION :1.6 : ANALYSIS AND VALUATION OF THE CROP :

1.6.1.1. Old stockmaps of all the compartments of Dhaba, Kothari, Rajura, Wirur, Wansadi and Ballarshah forest ranges have been for the preparation of draft working plan report. The stock mapping of compartments of earstwhile Dhaba Range comprising compartments of Ballarshah, Kothari and Dhaba Ranges was carried out during 1949-50. No fresh stockmapping was carried out during Khisti's Plan. Some informations such as density, age, erosion status and regeneration of prominent species have been incorporated on stock maps. The satellite imageries have been used for density stratification GIS Cell at the office of Conservator of Forests Working Plan Nagpur.

1.6.1.2. For Rajura Sub Division comprising Rajura, Wansadi and Wirur Forest Ranges of Central Chanda Forest Division stockmapping was carried out during Bhogle's plan for Rajura, Chicholi, Garlapeth, Siddheshwar and Manickgarh blocks. During Kulkarni's plan stockmapping of all the areas was done. During the preparation of Dr. Nand Kishor's plan stockmapping of 189 compartments was done. However, stockmapping of Compartment No.

180, 181, 190, 191, 192, 193, 194, 195, 196, 197, 198 could not be carried out as most of the areas was found under cultivation or encroachment and boundary pillars not found on the ground. Similarly, Compartment No 201, 202, 203 and 134A were not stockmapped. All those stockmapping were shown on topo sheets of scale 2" = 1 mile (RF: 1: 31680). Quality classification based on the height of mature tress had been adopted to show the site qualities. Three site qualities III(15-21m), IV a(12-15m) and IV b(upto12m) were recognised. The all India Site Quality is being contemplated in this plan to bring the uniformity at national level. Site qualities are determined by measuring the top height of trees at the age of 50 years as follows: IV (12.2m-18.3m), III (18.3m-24.4m), II (24.4m-30.5m) and I (30.5m-36.6m). The types of forests viz. teak, mixed, salai, understocked areas, eroded areas(particularly from Rajura and Wirur Ranges), site quality, density, and occurrence of important species have been shown on the stockmaps. Occurrence of bamboo is also indicated. This plan is using those stockmaps as those information are still valid as those are of not so old that they can be discarded and site quality of the area remains unchanged unless drastic changes are made to alter it through external activities.

1.6.1.3. During this plan preparation all the compartments of the whole tract have been covered along with Reserved Forests, Protected Forests, Proposed Reserved Forests, Zudupi Jungle taken by Division and areas acquired under Compensatory Afforestation Scheme for enumeration of growing stock after sorting the areas with the help of satellite imageries maps and density of stock therein. Area under less than 0.4 density and steep slope have not been taken under enumeration. In the remaining area 1% sampling have been carried out for enumeration. Results have been shown on available maps.

1.6.1.4. Under this plan the density maps for the tract dealt with have been prepared by digital image processing by using remote sensing data in the office of Conservator of Forests Working Plan at Nagpur (MS).

SECTION:1.7 : WORKING CIRCLES:

1.7.1.1.The extent of areas under each working circle have been given in Appendices XXVI in Volume II Constitution of working circles along with number of compartments and area incorporated therein have been given there in. The extent of areas working circle and rangewise have been given below.

	Total area	TPL	SCI	IWC	FWC	AFF	MISC	BOWC
Rajura	10353.112	4569.073	5615.819	0	168.22	0	0	0
Wirur	19961.079	1126.89	10248.759	2526.654	1937.129	1221.48	2900.167	3753.089
Wansadi	48794.662	596.8	15242.613	5608.557	9085.826	16108.488	2152.378	4555.794
Dhaba	5976.138	341.481	5461.257	0	173.4	0	0	0
Khothari	13185.422	1432.147	214.283	2495.466	4270.882	4771.944	0	975.722
Ballarsha	16038.986	1138.001	9256.716	735.586	4908.683	0	0	11268.876
Total	114309.399	9204.392	46040.147	11366.263	20544.14	22101.912	5052.545	20553.481

SECTION :1.8: BLOCKS AND COMPARTMENTS:

1.8.1.1. The forests of Ballarshah, Kothari and Dhaba Forest Ranges are not divided into Blocks whereas those of Rajura, Wirur and Wansadi are divided into Blocks. The entire forest areas included into this plan is 1,14,309.399 hectare out of which 88,862.742 hectare of Reserved Forests, 19,647.197 hectare of Protected Forests and 5799.46 hectare of Unclassed Forests. This excludes the area already leased to Forest Development Corporation of Maharashtra a Maharashtra State Government Undertaking which is being managed under respective management plan duly sanctioned by the competent authority. New compartment numbers have been given to the areas covered under this plan for the first time treating each separate polygon of forest as distinct compartment. Similarly, old compartments which have more than one polygon have been renumbered for the sake of computer compatible identity for each forest area for computer compatible data creation and report generation. The statement of forest areas villagewise, survey numberwise or blockwise as per notification for

afforestation have been given in the appendix no I and XXII of Volume II. The rangewise extent of Reserved Forest and Protected Forests is given below :-

	RF	PF	UF	FDCM(RF)	Total
Rajura	9863.04	367.072	123	0	10353.112
Wirur	19883.189	0	77.89	0	19961.079
Wansadi	37610.764	5786.638	5397.26	0	48794.662
Dhaba	3430.119	2372.619	173.4	13150.269	5976.138
Kothari	6802.704	6354.808	27.91	15635.046	13185.422
Ballarsha	11272.926	4766.06	0	0	16038.986
Total	88862.742	19647.197	5799.46	28785.315	143094.714

SECTION:1. 9: PERIOD OF THE PLAN: 2004-2005 to 2013-2014

1.9.1.1. The period of the plan is fixed as 10 years after final sanction from competent authority after that it will be revised. Mid term review of the prescriptions of the working plan may be taken after expiry of 5 years of operation after which if required necessary amendment in prescriptions may be incorporated. After completion of plan period this plan will be revised.

CHAPTER - II

WORKING PLAN FOR SELECTION CUM IMPROVEMENT

WORKING CIRCLE.

SECTION:2.1: GENERAL CONSTITUTION OF THE WORKING CIRCLE :

2.1.1.1. This working circle includes the forest areas of Ballarshah, Kothari and Dhaba Forest Ranges worked under Coppice with Reserve system and the untackled areas as Conversion Working Circle in khisti's plan and also other miscellaneous and teak forests. This working circle, also includes the forest areas of Rajura, Wirur and Wansadi Forest Ranges worked under Selection Cum Improvement W.C. in Dr. Nandkishor,s plan and areas having very good forests as well as the areas of new reserved forests. The total forest areas included in this working circle is approximately 46040.147 ha The range wise distribution of this area is as follows:

RANGEWISE DISTRIBUTION OF AREA IN SCI WC.

Range	Range area in ha	Area of W.C. in ha.	% area with respect to range area.	% Area of W.C. with respect to total area of W.C. in division.
Ballarshah	16,038.990	9,256.716	58%	20.11%
Dhaba	5,976.138	5,461.257	91%	11.86%
Kothari	13,185.420	214.983	2%	0.48%
Rajura	10353.110	5,615.819	54%	12.19%
Wansadi	48,794.660	15,242.613	31%	33.10%
Wirur	19,961.080	10,248.759	51%	22.26%
Total	1,14,309.4	46,040.147	40%wrt division	100%

SECTION:2. 2 : GENERAL CHARACTER OF THE VEGETATION :

2.2.1.1. The areas allotted to this working circle are having miscellaneous and teak forests which are capable of producing both large and small sized timber. The crop consists predominantly of miscellaneous species. The occurrence of teak, bija, shisham is very less and their proportion is very low. Teak forests occur in small patches except in few compartments where the percentage of teak is about 60%. The growing stock is characterized by the presence of Teak, Bhirra, Dhawada, Lendia, Surya, Rohan, Garari, Moha, Ain, Tendu, Aonla, Khair, Bija, Shisham, Mowai, Salai, Kalam, Achar, Siras, Semal, Kasai, Kakai, Amaltas, Papad, Dhaman etc. The density of the crop varies from 0.4 to 0.9. The site quality varies from III, III/IV and IV of all India Site Quality Types with predominance of site qualities of III, III/IV and IV. Better site qualities are confined to the nala and along areas of better soil. Some area of compartment No. D446 of umari Beat is swampy and the rest is grassland. The crop is generally young to middle aged with scattered matured trees. Matured trees or big sized trees are generally Moha and other fruit trees which have been reserved during the past working. At some places crop consists of young poles and is congested. Area is badly infested with climbers such as Kukuranji, Eroni, etc. The natural regeneration of Teak, Bhirra, Surya, Kasai, Dhawada, Garari, Lendia, Ain, Rohan, Achar, Moha, Tendu, Bel, Biba, Khair etc. is very satisfactory in areas away from the villages irrespective of site qualities. The regeneration suffers even in better site quality areas where grazing pressure is more. The over all status of natural regeneration is satisfactory. The natural regeneration of

Bija is deficient that of Shisham is scattered and that of teak not upto the mark. The bad regeneration is probably due to selection of bad silvicultural system in the past and improper attending of other silvicultural operations prescribed. Tendu regeneration is profuse but surprisingly established regeneration is rare. Big Tendu trees are badly pollarded for large flush of Tendu leaves production which are yearly plucked by Licence Holder for Tendu Leaves collection given by State Government every year. This gives the indication of threat to future seed bearer. The sorry status of Tendu is mainly due to the part of the policy of Tendu Leaves collection. The provision of pruning in the policy is mainly responsible for this sorry state of Tendu. Bamboo regeneration is profuse in some hilly areas. The formation of clump is getting momentum with passage of time after gregarious flowering in mid 1986-88. The advantage of the satisfactory status of natural regeneration is to be taken as a tool to regenerate these areas. To bring the balance condition and increase productivity, some of important species like Bija, Shisham, Teak etc will be introduced by way of gap planting and seed sowing and they will be given preferential treatment while carrying out the silvicultural operations.

SECTION:2. 3: BLOCKS COMPARTMENTS AND FELLING SERIES :

2.3.1.1. This working circle includes about 46040.147 hectares of forest land. No block formation has been segregated for exclusive management of forests under this working circle. The distribution of the compartments along with the area is given in appendix No.XXVI

SECTION:2.4: SPECIAL OBJECTS OF MANAGEMENT :

2.4.1.1. As per the National Forest Policy, the main object of the management is to have ecological balance. This implies to restore the normal condition in the forest. Thus the ultimate aim of the management is to bring normalcy in the forest which will take care of balanced condition of ecosystem. The state of balanced ecosystem means the balanced dependence for eternity of all the members of the ecosystem among themselves to remain undisturbed in perpetuity. Other objectives are for short term physical benefits of the forest produce.

2.4.1.2. On the above considerations the special objects of management decided are as follows:

- (i) To increase the value and productivity of the area to the silvicultural and ecological possible extents and
- (ii) To obtain big and small sized timber, poles and firewood on sustained basis by way of improvement operations to meet the local requirement to the possible extent and ensure the sustained yield of aforesaid produce together with large sized timber in future.
- (iii) To restore the conducive habitat for wild animals.

SECTION:2. 5: ANALYSIS AND VALUATION OF THE CROP :

2.5.1.1. STOCK MAPPING: Stock mapping of the reserved forests of Ballarshah, Kothari and Dhaba Forest Ranges were carried out during 1995-96 and that of Rajura, Wansadi and Wirur during 1992-93.

2.5.1.2. ENUMERATION: 1% enumeration by the line systematic sampling method was carried out during the 1995-96 period in Dhaba, Kothari and Ballarshah areas and 20% enumeration was carried out during 1989-90 period.

TO ABTRACT IN AS BELOW
Stocking in SCI

Girth	Group-1	Group-2	Group-3	Group-4	Group-5	Total
16-30	33.91	9.21	2.25	6.61	3.37	55.34
31-45	20.97	5.36	1.96	4.74	1.05	34.09
46-60	12.99	3.20	1.36	2.52	0.63	20.70
61-75	5.06	1.62	0.90	1.05	0.42	9.05
76-90	1.10	1.39	0.75	0.46	0.47	4.18
91-105	0.69	0.86	0.48	0.20	0.37	2.60
106-120	0.17	0.67	0.34	0.05	0.37	1.60
121-135	0.11	0.43	0.20	0.01	0.27	1.02
136-150	0.17	0.52	0.26	0.02	0.47	1.44
151up	0.01	0.00	0.00	0.00	0.01	0.02
Total	75.18	23.26	8.50	15.66	7.43	130.04
r1	63.74	71.29	17.54	79.13	47.28	278.98
r2	64.86	74.49	20.01	84.78	46.48	290.62
r3	65.04	78.86	17.96	82.38	48.07	292.30

2.5.1.3. DENSITY AND AGE CLASSES: The crop is young to middle aged with scattered mature trees of fruit species. Density generally varies from 0.4 to 0.9. Some under stocked and blank patches of more than one hectare are also included. In unworked conversion working circle area the crop is matured to overmatured.

2.5.1.4. REGENERATION: Natural regeneration of miscellaneous species is satisfactory where grazing incidence is less. Regeneration in forest around villages where incidence of grazing is high is invariably from poor to absent. The regeneration of Bija, Teak, Shisham is poor due to lack of seed bearers that resulted mainly due to wrong application of silvicultural system. Coppice regeneration of Garari is very good through out the area and that of teak in scattered patches. Coppice regeneration of other species is completely absent.

SECTION : 2.6: HARVESTABLE GIRTH:

2.6.1.1. The following table shows the harvestable girth of different species, according to its site quality.

SPECIES	TEAK (Tectona grandis)				
SITE QUALITY	II	II/III	III	III/IV	IV
Teak Harvestable girth	135	120	105	90	75
GROUPS	MISCELLANEOUS SPECIES				
A: Ain, Bija, Haldu, Kusum	165	150	135	120	105
B: Others	150	135	120	105	90
C: Khair, Lendia, Garari	45	45	45	45	45

2.6.1.2. Lendia and garadi should be completely removed above exploitable girth. Except for group –I, all trees of group-II above exploitable girth will be removed, provided, these are silviculturally available.

SECTION 2.7: STRUCTURE AND SILVICULTURAL SYSTEM:

2.7.1.1. In the case of all aged forests, trees of all ages (and sizes) are found mixed together on every smallest unit of area. Smaller and younger trees occur either under older and larger trees in gaps or openings in the upper canopy. The oldest and largest trees are scattered everywhere. Besides, certain species can not grow in healthy condition beyond certain limits and therefore, these are to be selected first for the number of stand to be removed from girth classes corresponding to the aforesaid limits and above. Under such circumstances the only answer for the management system is selection. But at the same time felling is to be done in all girth classes aiming at both regeneration and improvement of the crop. Thus, the most suitable silvicultural system for all aged forest is “Selection Cum Improvement System”. Plantations of teak has also

been prescribed by selectively removing the canopy, and hence the silvicultural system can be modified as selection cum improvement cum overwood removal.

2.7.1.2. The present selection system is different from traditional selection system. In traditional selection silvicultural system of management, single harvestable girth is decided for entire area of the working circle irrespective of site qualities. But the matter of fact is that the growth and silvicultural maturity of any species are the function of site quality and age. If the harvestable girth decided corresponds to site quality I, hardly any tree of this girth could be available in II/III, III, III/IV and IV site quality areas and consequently marking based on it, done in such areas, will leave even mature and over mature trees standing. On the contrary if the harvestable girth corresponds to site quality IV, trees of the same girth in areas having site quality higher than IV will be silviculturally immature but on marking, based on this girth, they will also be marked. This has been done away with in the present selection system. Since in all aged forests, trees of all age up to the age of rotation are found mixed together on every smallest unit of area and are scattered everywhere and therefore the working will be diffused over all over area. The felling will be selective in nature and the crop will be harvested according to the harvestable girth permitted for each species according to its site quality

2.7.1.3. The condition of miscellaneous forests seldom suits to strong light demander species, such as teak, khair etc. and therefore, such species are rarely found in good proportion in miscellaneous forests. Besides, it is not advisable to disturb the nature and so to the greatest extent our approach of management should be to remain as close as possible to the natural process. Changing the crop composition by artificial means amounts to interference with the nature. But introducing the species which were the local species of area in the past but not available at present will not violate the normal process. Therefore, to improve the productivity of the forest we need to have such valuable species in considerable proportion. For doing so, an artificial regeneration will be resorted. In the gap, created by the main felling, planting of suitable species can be taken but at least 5 years such environment will have to be provided to planted seedlings to facilitate their establishment. Otherwise, such proposition can not be successful. The experiment should be started with teak and teak polypot seedling could be tried.

SECTION 2.8 : CHOICE OF SPECIES:

2.8.1.1. Teak, Shisham, Bija, Haldu, Ain Tiwas are important trees species with reference to their financial values and demand of the people. Therefore, they will have edge over others. Besides, other species producing Non Timber Forest Produces will also be given due weightage. The rare species will be given top priority. They will be preserved. Unknown plants will not be felled without identifying them. In areas of inferior site quality Rohan, Bhirra, Khair, Garari, Lendia, Dikamali, Nirmali etc. will be favoured. The percentage, as decided for II/III site in above table, will be decided as per their social, ecological and financial importance. The shade and fruit bearer species in optimum number will be favoured to meet the requirement of the wildlife. The area with inadequate teak population will be facilitated with teak planting in suitable areas whereas in areas with high proportion of teak non teak population is to be increased with planting of non teak species of favouring the natural regeneration of non teak.

SECTION: 2.9 : FORMATION OF FELLING SERIES AND COUPES:

2.9.1.1. The total number of felling series carved out of total areas of this working circle will be 15. Each felling series will be divided into 20 annual coupes. The coupes will be laid down from ridge to valley to have watershed approach compatible. The sequence of working will be given in Appendix XXVIII(a)

SECTION : 2. 10 : REGULATION OF YIELD:

2.10.1.1. In a balanced normal forest, the yield always remains sustained. The normality is achieved after a rotation in general. However, looking into the crop composition and statistics of growth, it is quite possible that the forests of this working circle can be brought to normalcy within a four felling cycles with some efforts. The annual yield will be regulated by area by making coupes as far as equiproductive in each felling series.

SECTION: 2.11. : YIELD CALCULATION:

2.11.1.1. Yield calculation has been done with the help of K.P. Sagreiya's modification of Brandis formula for selection felling. Sequential steps involved for yield calculation are as follows.

2.11.1.2. STEMS PER HA : From the enumeration data the weighted average number of stems/ha of all three groups of trees for the track dealt with were obtained which are given as follows :

Girth Class	Enumerated stems/ha			Total
	A	B	C	
15-30	24.2	49.56	2.34	76.10
30-45	15.37	17.23	0.75	33.35
45-60	13.64	6.67	0.55	20.86
60-75	18.95	4.81		23.76
75-90	21.05	6.17		27.22
90-105	18.88	6.98		25.86
105-120	11.48	8.09		19.57
120-135	7.16	11.23		18.39
135-150	7.47			7.47
Total	138.20	110.75	3.63	252.58

2.11.1.3. SURVIVAL PERCENTAGE : The survival percentage is the number of stems out of 100 in the girth class reaching to the harvestable girth or Class I. This is maximum in open area and optimum in harvestable state of the crop and decreases with increase in stem density. With the existing number of stems/ha it will be maximum if they are distributed among different girth classes in balanced proportion. Therefore, distribution of the total existing number of stems/ha of a group of species in different girth classes in a state of balanced condition is required to know the survival percentage. The expected number of stems in different girth classes in site quality III in evenly balanced state have been calculated with the help of available data and using the law of proportion and from which survival percentages were obtained which are given in the following table:

Girth Class	Enumerated No of stems/ha			Total	Balanced Stems/ha & survival %					
	A	B	C		A	%	B	%	C	%
15-30	24.2	49.56	2.34	76.10	48.82	9.24	40.45	10.31	1.81	37.02
30-45	15.37	17.23	0.75	33.35	31.16	14.47	25.81	16.16	1.15	58.26
45-60	13.64	6.67	0.55	20.86	17.97	25.09	14.88	28.02	0.67	100.0
60-75	18.95	4.81		23.76	11.26	40.05	9.33	44.69		
75-90	21.05	6.17		27.22	7.60	59.34	6.30	66.19		
90-105	18.88	6.98		25.86	6.21	72.64	5.14	81.13		
105-120	11.48	8.09		19.57	5.63	80.11	4.67	89.29		
120-135	7.16	11.23		18.39	5.03	89.66	4.17	100.0		
135-150	7.47			7.47	4.51	100.0				
Total	138.2	110.8	3.6	252.6	138.2		110.8		3.63	

Note : 1) Balance stems/ha stands for the distribution of existing stems in different girth classes in an evenly balanced conditions.

2) % stands for survival % of the stems in a girth class for reaching harvestable girth.

2.11.1.4 YIELD REGULATION FOR GROUP 1 SPP. SHOWN IN TABLE

Girth Class	Stem per ha.	% of survival	Stem/ha reaching harvestable size (3x4)	Years required to pass over next girth class	Average annual recruitment
15-30	24.20	9.24	2.24	13	0.172 R ₁
30-45	15.38	14.47	2.23	14	0.159 R ₂
45-60	13.64	25.09	3.42	14	0.244 R ₃
60-75	18.95	40.05	7.59	14	0.632 R ₄
75-90	21.05	59.34	12.49	12	1.040 R ₅
90-105	18.88	72.62	13.71	12	1.142 R ₆
105-120	11.48	80.11	9.20	12	0.657 R ₇
120-135	7.16	89.66	6.42	14	0.401 R ₈
135-150	7.47	100.00	7.47	16	

The no. of trees which will be recruited during felling cycle of 20 years is given below.

$$\begin{aligned}
 FR_1 &= 16 R_8 + 4 R_7 &= 6.416 + 2.628 &= 9.044 \\
 FR_2 &= 10 R_7 + 10 R_6 &= 6.57 + 11.42 &= 17.99 \\
 FR_3 &= 2 R_6 + 12 R_5 + 6 R_4 &= 2.284 + 12.48 + 3.792 &= 18.556 \\
 FR_4 &= 6 R_4 + 14 R_3 &= 3.792 + 3.416 &= 7.208 \\
 FR_5 &= 14 R_2 + 6 R_1 &= 2.226 + 1.032 &= 3.258 \\
 FR_6 &= 7 R_1 + 13 R_8 &= 1.204 + 5.213 &= 6.417
 \end{aligned}$$

1st felling cycle - Realisable recruitment

$$\begin{aligned}
 \text{a)} \quad & \frac{R_x \cdot a^2}{f} \\
 &= \frac{R_8 \cdot 16^2}{40} \\
 &= \frac{0.401 \times 16^2}{40} \\
 &= 2.566 \\
 \text{b)} \quad & \frac{a \cdot b R_x}{f} + \frac{b^2 R_{x-1}}{2f} \\
 &= \frac{16 \times 4 R_8}{20} + \frac{4^2 R_7}{40} \\
 &= \frac{16 \times 4 \times 0.401}{20} + \frac{42 \times 0.657}{40}
 \end{aligned}$$

$$\begin{aligned}
 &= 1.283 + 0.263 = 1.546 \\
 (a) + (b) &= 2.566 + 1.546 = 4.112
 \end{aligned}$$

Accumulated Recruitment

$$\begin{aligned}
 R_a &= f_{rn} - R_r \\
 &= 9.044 - 4.112 = 4.932
 \end{aligned}$$

2nd Felling Cycle

Realisable Recruitment

$$\begin{aligned}
 a) &= \frac{R_x a^2}{40} \\
 &= R_7 10^2 = \frac{0.657 \times 10^2}{40} = 1.643
 \end{aligned}$$

$$\begin{aligned}
 b) &= \frac{a \cdot b \cdot R_x}{f} + \frac{b^2 R_{x-1}}{2f} \\
 &= \frac{10 \times 10 R_7}{40} + 10^2 R_6 \\
 &= \frac{10 \times 10 \times 0.657}{40} + 102 \times 1.142 \\
 &= 3.285 + 2.855 = 6.14 \\
 (a) + (b) &= 1.643 + 6.14 = 7.783
 \end{aligned}$$

Accumulated Recruitment

$$\begin{aligned}
 R_a &= f_{rn} - R_r \\
 &= 17.99 - 7.783 \\
 &= 10.207
 \end{aligned}$$

3rd Felling Cycle.

Realisable Recruitment

$$\begin{aligned}
 a) &= \frac{R_x a^2}{40} = R_6 \times 2^2 \\
 &= \frac{1.142 \times 2^2}{40} \\
 &= 0.114
 \end{aligned}$$

$$\begin{aligned}
 b) &= \frac{a \cdot b \cdot R_x}{20} + \frac{b^2 R_{x-1}}{40} \\
 &= \frac{2 \times 12 R_6}{20} + \frac{12^2 R_5}{40} \\
 &= \frac{2 \times 12 \times 1.142}{20} + \frac{12^2 \times 1.040}{40} \\
 &= 1.370 + 3.744 \\
 &= 5.114
 \end{aligned}$$

$$\begin{aligned}
 c) &= \frac{a \cdot c \cdot R_x}{20} + \frac{b \cdot c \cdot R_{x-1}}{20} + \frac{c^2 R_{x-2}}{40} \\
 &= \frac{2 \times 6 R_6}{20} + \frac{12 \times 6 R_5}{20} + \frac{6^2 \times R_4}{40} \\
 &= \frac{2 \times 6 \times 1.142}{20} + \frac{12 \times 6 \times 1.040}{20} + \frac{6^2 \times 0.632}{40}
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{20}{0.685} + \frac{20}{3.744} + \frac{40}{0.569} \\
 &= 4.998
 \end{aligned}$$

$$\begin{aligned}
 (a) + (b) + (c) &= 0.114 + 5.114 + 4.998 \\
 &= 10.226
 \end{aligned}$$

Accumulated Recruitment

$$\begin{aligned}
 R_a &= f_{rn} - R_r \\
 &= 18.556 - 10.226 = 8.33
 \end{aligned}$$

4th Felling Cycle.

Realisable Recruitment

$$\begin{aligned}
 a. \quad \frac{a^2 R_x}{40} &= \frac{6^2 \times R_4}{40} \\
 &= \frac{6^2 \times 0.632}{40} \\
 &= 0.569
 \end{aligned}$$

$$\begin{aligned}
 b) \quad \frac{a \cdot b \cdot R_x}{20} &+ \frac{b^2 R_{x-1}}{40} \\
 &= \frac{6 \times 14 \times R_4}{20} + \frac{14^2 R_3}{40} \\
 &= \frac{6 \times 14 \times 0.632}{20} + \frac{14^2 \times 0.244}{40} \\
 &= 2.654 + 1.196 \\
 &= 3.850
 \end{aligned}$$

$$\begin{aligned}
 (a) + (b) &= 0.569 + 3.850 \\
 &= 4.419
 \end{aligned}$$

Accumulated Recruitment

$$\begin{aligned}
 R_a &= f_{rn} - R_r \\
 &= 7.208 - 4.419 \\
 &= 2.789
 \end{aligned}$$

5th Felling Cycle.

Realisable Recruitment

$$\begin{aligned}
 a. \quad \frac{a^2 R_x}{40} &= \frac{14^2 \times R_4}{40} \\
 &= \frac{14^2 \times 0.159}{40} \\
 &= 0.779
 \end{aligned}$$

$$b) \quad \frac{a \cdot b \cdot R_x}{20} + \frac{b^2 R_{x-1}}{40}$$

$$\begin{aligned}
&= \frac{14 \times 6 R_2}{20} + \frac{6^2 R_1}{40} \\
&= \frac{14 \times 6 \times 0.159}{20} + \frac{6^2 \times 0.172}{40} \\
&= 0.668 + 0.155 \\
&= 0.823
\end{aligned}$$

$$(b) + (b) = 0.779 + 0.823 = 1.602$$

Accumulated Recruitment

$$\begin{aligned}
R_a &= f_{rn} - R_r \\
&= 3.258 - 1.602 \\
&= 1.656
\end{aligned}$$

6th Felling Cycle.

Realisable Recruitment

$$\begin{aligned}
a. \quad &\frac{a^2 R_x}{40} \\
&= \frac{7^2 \times R_1}{40} = \frac{7^2 \times 0.172}{40} \\
&= 0.779
\end{aligned}$$

$$\begin{aligned}
b) \quad &\frac{a \cdot b \cdot R_x}{20} + \frac{b^2 R_{x-1}}{40} \\
&= \frac{7 \times 13 R_1}{20} + \frac{13^2 R_3}{40} \\
&= \frac{7 \times 13 \times 0.172}{20} + \frac{13^2 \times 0.401}{40} \\
&= 0.783 + 1.694 = 2.477
\end{aligned}$$

Accumulated Recruitment

$$\begin{aligned}
R_a &= f_{rn} - R_r \\
&= 6.417 - 2.477 \\
&= 3.94
\end{aligned}$$

			Hence Available in cycle
1 st Felling Cycle	Realisable	4.112	4.112
	Accumulated	4.932	12.715
2 nd Felling Cycle	Realisable	7.783	
	Accumulated	10.207	20.433
3 rd Felling Cycle	Realisable	10.226	

4 nd Felling Cycle	Accumulated	8.33	}	12.749
	Realisable	4.419		
5 nd Felling Cycle	Accumulated	2.789	}	4.391
	Realisable	1.602		
6 nd Felling Cycle	Accumulated	1.656	}	4.133
	Realisable	2.477		
	Accumulated	3.94		

Felling Cycle	Hence available in cycle	Annual average recruitment	Annual average Vol (m²)
1 st	4.112	0.206	0.212
2 nd	12.715	0.636	0.654
3 rd	20.433	1.022	1.051
4 th	12.749	0.637	0.655
5 th	4.391	0.220	0.226
6 th	4.133	0.207	0.213

Anunal realisable yield in cycle

1 st stock in land	I	II	III	IV	V	V
1 st	0.5791	0.636	1.022	0.637	0.220	0.207
2 nd	0.608	0.608	1.022	0.637	0.220	0.207
3 rd	0.746	0.746	0.746	0.637	0.220	0.207
4 th	0.719	0.719	0.719	0.719	0.220	0.207
5 th	0.619	0.619	0.619	0.619	0.619	0.207
6 th	0.550	0.550	0.550	0.550	0.550	0.550

Yield in first 6 felling cycle

a	Total Realisable trees	=	7.47 + 4.112
		=	11.582

b Total Prescribed trees = 0.550 x 20
 = 11

$$\begin{aligned}\text{Percentage Removal} &= \frac{11}{11.582} \times 100 \\ &= 94.97\%\end{aligned}$$

Hence 9 trees marked in the girth class of the out of 10 shall be removal

Yield regulation for Group 2 spp. Shown in liable

Girth Class	Stem per ha.	% of survival	Stem/ha. reaching harvestable	Years required to pass over next	Average annual recruitment
-------------	--------------	---------------	-------------------------------	----------------------------------	----------------------------

			size.	girth class	
15-30	49.56	10.31	5.11	15	0.340 R ₁
30-45	17.23	16.16	2.78	16	0.173 R ₂
45-60	6.77	28.02	1.89	15	0.126 R ₃
60-75	4.81	44.69	2.14	14	0.153 R ₄
75-90	6.17	66.19	4.08	14	0.291 R ₅
90-105	6.98	81.13	5.66	14	0.404 R ₆
105-120	8.09	89.29	7.22	14	0.516 R ₇
120-135	11.23	100.00	11.23	0	0
135-150	0	0	0	0	0

The no. of trees which will be recruits during felling cycle of 20 years is given below

$$f R_1 = 14 R_7 + 6 R_6 = 7.224 + 2.424 = 9.648$$

$$f R_2 = 8 R_6 + 12 R_5 = 3.232 + 3.492 = 6.724$$

$$f R_3 = 2 R_5 + 14 R_4 + 4 R_3 = 0.582 + 2.142 + 0.504 = 3.228$$

$$f R_4 = 14 R_3 + 6 R_2 = 1.386 + 1.557 = 2.943$$

$$f R_5 = 14 R_2 + 6 R_1 = 1.211 + 4.42 = 5.631$$

1st Felling Cycle.

Realisable Recruitment

$$\begin{aligned}
 \text{a. } \frac{a^2 R_x}{40} &= \frac{14^2 \times R_7}{40} \\
 &= \frac{14^2 \times 0.516}{40} \\
 &= 2.528
 \end{aligned}$$

Yield regulation for Group 2 spp. Shown in table

Girth Class	Stem per ha.	% of survival	Stem/ha. reaching harvestable size.	Years required to pass over next girth class	Average annual recruitment
15-30	2.34	37.02	0.87	16	0.054 R_1
30-45	0.75	58.26	0.43	20	0.021 R_2
45-60	0.55	100.00	0.55		
60-75					
75-90					
90-105					
105-120					
120-135					
135-150					

The no. of trees which will be recruits during felling cycle of 20 years is given below

$$f R_1 = 20 R_2 = 0.42$$

$$f R_2 = 16R_1 + 4 R_2 = 0.864+0.084=0.948$$

$$f R_3 = 16 R_2 + 4 R_1 = 0.336+0.216=0.552$$

1st Felling Cycle.

Realisable Recruitment

$$\begin{aligned}
 a. \quad &= \frac{1}{2} \{f_{rn} - 0\} \\
 &= \frac{1 \times 0.42}{2} \\
 &= 0.21
 \end{aligned}$$

Accumulated Recruitment

$$\begin{aligned}
 R_a &= f_{rn} - R_2 \\
 &= 0.42 - 0.21 \\
 &= 0.21
 \end{aligned}$$

2nd Felling Cycle.

Realisable Recruitment

$$\begin{aligned}
 a. \quad \frac{a^2 R_x}{40} &= \frac{16^2 \times R_1}{40} \\
 &= \frac{16^2 \times 0.054}{40} \\
 &= 0.3456
 \end{aligned}$$

$$\begin{aligned}
b) \quad & \frac{a \cdot b \cdot R_x}{20} + \frac{b^2 R_{x-1}}{40} \\
= & \frac{16 \times 9 R_1}{20} + \frac{4^2 R_2}{40} \\
= & \frac{16 \times 4 \times 0.054}{20} + \frac{4^2 \times 0.021}{40} \\
= & 0.1728 + 0.0084 \\
= & 0.1812
\end{aligned}$$

$$(a) + (b) = 0.3456 + 0.1812 = 0.5268$$

Accumulated Recruitment

$$\begin{aligned}
R_a &= f_{rn} - R_r \\
&= 0.948 - 0.5268 \\
&= 0.4212
\end{aligned}$$

3rd Felling Cycle.

Realisable Recruitment

$$\begin{aligned}
a. \quad & \frac{a^2 R_x}{40} = \frac{16^2 \times R_2}{40} \\
& = \frac{16^2 \times 0.21}{40} \\
& = 0.1344 \\
\\
b) \quad & \frac{a \cdot b \cdot R_x}{20} + \frac{b^2 R_{x-1}}{40} \\
= & \frac{16 \times 4 R_2}{20} + \frac{4^2 R_1}{40} \\
= & \frac{16 \times 4 \times 0.21}{20} + \frac{4^2 \times 0.054}{40} \\
= & 0.0672 + 0.216 \\
= & 0.0888
\end{aligned}$$

$$\begin{aligned}
(a) + (b) &= 0.1344 + 0.0888 \\
&= 0.2232
\end{aligned}$$

Accumulated Recruitment

$$\begin{aligned}
R_a &= f_{rn} - R_r \\
&= 0.552 - 0.2232 \\
&= 0.3288
\end{aligned}$$

			Hence Available in cycle
1 st Felling Cycle	Realisable	0.21	0.21
	Accumulated	0.21	0.7368
2 nd Felling Cycle	Realisable	0.5268	
	Accumulated	0.4212	0.6444
3 rd Felling Cycle	Realisable	0.2232	
	Accumulated	0.3288	

Felling Cycle	Hence available in cycle	Annual average recruitment	Annual average Vol (m ²)
1 st	0.21	0.0105	0.0004
2 nd	0.7368	0.0368	0.0016
3 rd	0.6444	0.0322	0.00144

Annual realisable yield in cycle

1 st stock in land	I	II	III
1 st	0.038	0.0368	0.0322
2 nd	0.0374	0.0374	0.0322
3 rd	0.0357	0.0357	0.0357

Yield in first 6 felling cycle

a Total Realisable trees = 0.55 + 0.21
 = 0.76

b Total Prescribed trees = 0.0357 x 20
 = 0.714

Percentage Removal = $\frac{0.714 \times 100}{0.76} = 93\%$

Hence 9 trees marked in the girth class of the out of 10 shall be removal

Group	Yield Prescribed
1) Group-I	9 out of 10 trees shall be marked for felling.
2) Group-II	9 of 10 trees shall be marked for felling.

SECTION 2. 12 : AGENCY FOR HARVESTING:

2.12.1.1 The felling of coupes, after marking, will either be done departmentally or through FLCS or through JFM Committee. However, subsidiary silvicultural operations, soil and moisture conservation works, planting and fire protection works will be carried out departmentally.

SECTION 2. 13: DEMARCATION OF COUPES PREPARATION OF TREATMENT MAP & MARKING TECHNIQUE:

2.13.1.1. Coupes will be demarcated one year in advance of working (felling etc) as per the procedure laid down under Other Important Regulations. After demarcation, within the coupe, area will be divided into quality classes if the extent of any quality area is more than 2 ha

PREPARATION OF TREATMENT MAP:

2.13.1.2. A broad treatment map will be prepared in GIS all showing unworkable area, buffer and various density class. The finer details will be elaborated by R.F.O. and checked by A.C.F.

2.13.1.3. TYPE - A : PROTECTION AREAS:

This will include

Areas on slopes more than 25 degree;

20 meter (One chain) wide area on either side of banks of nallas and river courses.

2.13.1.4. TYPE – B : UNDERSTOCKED AREAS :

This will include all areas below 0.4 density.

2.13.1.5. TYPE – C : GROUP OF YOUNG POLES:

This will include areas having group of young poles an extent of minimum 2 ha at a place.

2.13.1.6. TYPE – D₁ : WELL STOCKED AREAS:

This will include all areas above 0.4 density.

To facilitate the preparation of treatment map each coupe, in general, will be divided into 4 sections. Each type of area will be demarcated of its extent at one place is minimum 2 ha Except the nalla banks etc. which will be marked irrespective of its extent. On receipt of the treatment map, the same will be scrutinised by an ACF and approved by the Dy. Conservator of Forests, No area will be treated as unworkable as some kinds of work will be carried out in each type of the area mentioned above.

2.13.1.7. TYPE – D₂ :

Area to be planted with teak after canopy removal. It will include the area with a well drain soil having teak supportive soil like sandy loam having ph between 6.5 to 7.5, site quality III and has indicator species of teak climax.

2.13.2.1. DETERMINATION OF THE AREA FIT FOR OVERWOOD REMOVAL

Two representative sample each of six 50m x 50m will be taken in a patch of approximate 10 ha. It will be enumerated and the critical girth will be calculated as below. This critical girth will decide whether this area of minimum ten ha is to be selectively removed or not.

(a) First, the average crop girth (O.B) of the forest selected will be determined according to the following formula: **Crop girth = $2 \times \sqrt{(\pi \times B / N)}$** .

Where “B” represents average basal area per hectare. and “N” represents average number of trees per hectare in the crop excluding advance growth. The basal area may be measured with the help of wedge prism of suitable BAF (Basal Area Factor) or computed by summing up the cross sectional areas of the individual trees based on over bark girth measurements. Trees up to 30 cms, 45 cms, and 60 cms girth (o.b) in the teak site quality up to III,II/III, upto II, I/II and I respectively shall be treated as advance growth for the purpose and would not be considered for determining either the value of “B” or “N”.

(b) The average Crop Girth so computed will be compared with the critical crop girth as given in the table below. No forest in a plot of 10 ha. shall be selected for the purpose of removal of over wood if its average Crop Girth (O.B.) is less than the Critical Crop Girth as given in column 5 of the table in respect of areas of teak site quality mentioned against them in column 3 which correspond to the average height of dominant mature teak trees (& if teak is absent, then bija, haldu, ain or semal) in the crop as given in Col.2. This Critical Crop Girth relates to high forests only. The proportion of teak, bija, ain, haldu and kalam in the crop, as mentioned in Col. 4, will be calculated after excluding the advance growth.

TABLE SHOWING CRITICAL CROP GIRTH

Sr. No.	Average height of dominant mature trees in	Corresponding all India	Proportion of teak, bija, ain, haldu and	Critical Crop
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	the crop.	teak site quality	kalam in the crop.	Girth
1	2	3	4	5
1	Upto 21 meters.	Upto III	More than 40%	70 cms
2	Upto 21 meters	Upto III	20% to 40%	60cms
3	Upto 21 meters	Upto III	Below 20%	50cms
4	21 to 27 meters	II/III,II	More than 40%	85cms
5	21 to 27 meters	II/III,II	20% to 40%	75cms
6	21 to 27 meters	II/III,II	Below 20%	65cms
7	Above 27 meters	I/II,I	More than 40%	110cms
8	Above 27 meters	I/II,I	20% to 40 %	95cms
9	Above 27 meters	I/II,I	Below 20%	80cms

(Figure taken is from the Forest Development Corporation of Maharashtra Limited's guidelines for overwood removal for teak plantation)

MARKING TECHNIQUE:

2.13.2.2. The trees in harvestable and preharvestable class will be enumerated. The trees shall only be removed from the harvestable girth, starting from above.

MARKING RULES:

2.13.2.3. Marking, technique has been described, in detail, in the Other Most Important Regulations. The marking rules and climber cutting for each type of area will be as follows:

2.13.2.4. TYPE – A : PROTECTION AREAS:

In protection area, no marking will be done.

2.13.2.5. TYPE – B : UNDERSTOCKED AREAS:

No. marking will be done, except

All dead trees after retaining 2 dead trees/ha

All live high stumps

All but one vigorously growing shoot/stool.

2.13.2.6. TYPE – C : GROUPS OF YOUNG POLES:

In such areas thinning marking will be done on the basis of normal stand table for the given site. First of all 10% enumeration of area by point sampling will be done. The abstract of the enumeration will tell the number of stems in different girth classes. The corresponding numbers are seen from normal stand table for the given site quality. If the abstract shows only 3 girth classes in that case the number of stems required in those girth classes will be obtained by multiplying the normal stand table no. by 10/3. In general the multiplication factor will be 10/n where n ranges from 1 to 10 and signifies the girth class.

2.13.2.7. TYPE – D : WELL STOCKED AREAS:

All edible fruit and flower yielding species which are capable of attaining girth more than highest harvestable girth i.e. 135 cm will be retained till attain the same. All trees above highest selection girth and approach class will be enumerated, before marking, in 15 cm girth classes. The following rules will be followed for marking.

- Only identified and silviculturally available tree species will be marked. Unidentified species shall not be marked until its identification is done and separate orders are obtained from the Conservator of Forests. This is important for preservation of rare species & their identification.
- All dead and malformed trees, irrespective of species and girth, after retaining 2 dead trees/ha will be marked. A tree will be treated as malformed if it does not have a clean bole upto atleast 2 m above breast height.
- All live high stumps will be marked for felling.
- All but one vigorously growing coppice shoot per stool, where density is less, will be marked.
- The cultivate girth of Khair, Garari and Lendia is 45 cm Therefore, all trees of these species will be marked in 60 - 75 and other higher girth classes. In 45 - 60 among surplus, these species will be marked first. Then, if required, other species will marked to remove congestion.

vi) The cultivate girth for other species is 120 cm Therefore, all such species in > 135 cm Girth class will be first marked. In 120- 135 girth class among surplus, these species will be marked first. Then , if required, other species will be marked to maintain balanced condition. The harvestable girth of teak and superior miscellaneous species and edible fruit trees is 135 cm In this class, teak and superior miscellaneous species will be marked first against surplus number. Marking will be done from higher girth. The following shall be removal above the harvestable girth, provided it is silviculturally available.

Group	Yield Prescribed
1) Group-I	9 out of 10 trees shall be marked for felling.
2) Group-II	9 of 10 trees shall be marked for felling.

2.13.2.8. PREPARATION OF TREATMENT MAP:

(a) On the average 250 Ha of area, evenly distributed among twenty felling series found suitable shall be overwood removed annually and planted with teak with the condition listed in proceeding sections of preparation of Treatment Maps.

(b) Thereafter, the following areas shall be clearly demarcated on the map :-

- (i) All areas having more than 25° slope.
- (ii) Heavily eroded areas and areas having exposed rocks.
- (iii) Patches of poorly stocked forests because of edaphic factors.
- (iv) 20-meter wide strip of forest along both sides of main water course and well defined nalas. (These may form coupe-lines/ section lines wherever possible).
- (v) Heavy water logged areas unfit for teak plantations.
- (vi) Site Quality IV areas.

No felling will be carried out in the above-mentioned areas. Such areas will be demarcated on the ground and delineated on the map.

The remaining area of this selected patch, found fit for teak plantation shall be overwood removed.

All areas of coupe-line and section lines containing existing forest will be shown on the map.

In the balance area, the following information is to be recorded and computed.

Top height of teak or its associates like ain, bija, dhawada, semal.

Average Basal areas per hectare. (Using wedge prism).

Remarks about fitness of area for teak plantation (use symbol F wherever the area is fit for teak plantation and symbol U wherever the area is unfit for teak Plantation).

SECTION 2 .14: SOIL AND MOISTURE CONSERVATION WORKS:

2.14.1.1. On approval of treatment map, soil and moisture conservation work will be started with marking and will be completed before the onset of monsoon in the next year. This will be done subject to the availability of the funds. Details of these works are given in the Other Most Important Regulations.

SECTION 2. 15 : METHODS OF REGENERATION:

2.15.1.1. In the next year of marking, soon after the monsoon is over, a treatment map will be prepared, which will show the following.

Areas with adequate natural regeneration and

Areas with inadequate regeneration.

AREAS WITH ADEQUATE REGENERATION:

2.15.1.3. In the next year of main felling, the naturally regenerated seedlings will be cleared off all undergrowth and will be spaced out uniformly so that the number of seedlings per ha is equal to the no. given in normal stand table. The miscellaneous species to be favoured are Bija, Shisham, Haldu, Tiwas, Ain , Kalam, Dhawada, Bhirra, Rohan, Garari and Lendia in order of priority. These seedlings will be treated at par with planted seedlings. Teak stumps will be planted in the openings created by felling of large sized trees. The number of stumps/ ha for gap planting will be decided by subtracting the existing no. of seedling from required number in normal condition (obtained from normal stand table). The teak stump should be prepared out of best quality seed. The length of the stump should be 9" (8" root +1" shoot above collar). Stumps should not be less than thumb thick. Intensive care will be taken for stumps planted for continuously five years. Any species interfering with the growth of teak will be removed. Teak seedlings will be kept absolutely free from climbers, shrubs etc. over lapping branches of neighbouring big trees can also be cut. Application of fertilizer should

also be used to boost up growth. Suitable fertilizer can be used also for superior miscellaneous species whose growth is slow and which are lagging behind in growth. Three weedings and soil working will be carried out around all the plants of height below 1m. Tending, singling cleaning will be done to seedlings for three years from the year of planting.

2.15.1.4. Both NR & AR will be protected rigidly from fire. Coppice shoots interfering with established NR & AR will be removed. The seedlings will be cleared of weeds within a radius of 1 m. The mulching should be done by spreading, around the seedlings in a radius 0.5 m, the twigs and debris to the extent of six inches thick layer, followed by layer of leaves, burnt up material and sufficient earth over it. This will facilitate protection from fire, drips from the nearby overgrowth and also lead to mulching.

Weeding, soil working and mulching will be carried out continuously for three years. In each second and third year only two weedlings and soil working will be carried out. The young recruits coming during these years and interfering with weeded plants will be removed.

AREAS WITH INADEQUATE N.R.:

2.15.1.5. In such areas, planting will be done in the following year of the main felling. The premonsoon works will be taken up just after felling and removal. In plantation upto 20% teak and rest other superior miscellaneous species may be preferred.

2.15.1.6. In suitable areas, underplanting of bamboo will be done. Suitability of the site will be certified by an ACF. Details of planting technique have been given in Other Important Regulations.

SECTION: 2. 16: SUBSIDIARY CULTURAL OPERATIONS:

2.16.1.1. The following works will be carried out in the following year of the main felling and in the subsequent years:

CUTTING BACK OPERATIONS:

2.16.1.2. These will be done in the following year of main felling. This will include following operations:

Felling of standing trees, marked for felling but not felled.

Felling of damaged trees, damage caused during felling, which are not likely to be recovered.

Cutting of climbers other than that of medicinal importance.

Cutting of all coppice shoots where natural regeneration is adequate.

Cutting of all malformed regeneration upto 15cm gbh.

CLEANING:

2.16.1.3 In the sixth year from the year of the main felling, the following operations will be done.

Cutting of climbers other than that of medicinal importance

Cutting of all coppice shoots where naturally regenerated or planted seedlings are adequately.

Removal of undergrowth interfering or likely to interfere with the growth of seedlings (natural or planted)

SECTION: 2. 17: OTHER REGULATIONS:**PROTECTION:**

2.17.1.1. The success of regeneration will depend upon the protection of all areas from fire and control on grazing. The vulnerable areas will be protected from illicit cutting also.

FIRE PROTECTION:

2.17.1.2. Special attention is needed to control the fire. The main felling coupe will be rigidly and effectively fire protected for a period of 5 years from the year of main felling. It is established fact that fire is the foremost reason of non establishment of natural regeneration. Grazing comes next. The details of fire protection measures are given in Other Important Regulations and NTFP working circle.

CLOSURE TO GRAZING:

2.17.1.3. The main felling coupes will remain closed to grazing for a period of 5 years from the year of main felling. The closed coupes will specifically be mentioned in the grazing license and the villagers will be made aware of them by regular drum beating in the villages. The suggestion given in misc. regulations to solve the grazing problem should be tried.

ENHANCEMENT OF CARRYING CAPACITIES:

2.17.1.4. In order to increase the availability of grass in the areas open to grazing, sowing of superior grasses, like Paonya, Sheda, marvel may be done in the suitable patches near villages but away from the closed coupes. These areas will remain closed to grazing from July to November, during which the seeding of grasses will be over. This closure will be done only during the first year of sowing. To have success in this work the villagers will have to be taken into confidence to ensure their cooperation.

CHAPTER-III

WORKING PLAN FOR IMPROVEMENT WORKING CIRCLE

SECTION: 3.1: GENERAL CONSTITUTION:

3.1.1.1. The areas which require improvement through silvicultural operations and/or artificial regeneration have been included in this working circle. The main aim is to improve the status of the crop and land. Therefore obtaining produce of any kind is neither expected nor regulated. However, through silvicultural operations like singling and cutting back, poles and firewood will be obtained. The area included in this working circle has a basal area between 4 to 8 sq meter per ha. except for few patches having harvestable growth. In the previous plan of khistri and Nandkishor, this working circle was not included.

The area allotted to this working circle is 11,366.263 ha.

ALLOTMENT OF AREA

Sr. No	Range	Area of Range	Area allotted	% W.R.T. Range area	% W.R.T. W.C. area
1	Ballarshah	16038.99	735.586	4.58	6.47
2	Dhaba	5976.138	0	0	0
3	Kothari	13185.42	2495.466	18.92	21.96
4	Rajura	10353.11	0	0	0
5	Wansadi	48794.66	5608.557	11.49	49.34
6	Wirur	19961.08	2526.654	12.65	22.23
	Total	114309.4	11366.263	9.94 wrt divn.	100%

SECTION:3.2: GENERAL CHARACTER OF THE VEGETATION:

3.2.1.1. Site quality -- IVb and IVa and even quality III with young crop.

Density -- less than 0.4 to 0.6 or even more at places.

Major specie -- Teak

Other species -- Salai, Dhawada, Mowai, Ain, Hirda, Behada, etc. Age of the crop -- Young to middle aged.

3.2.1.2. The area in general supports the poor coppice crop of stunted teak trees which are largely malformed and crooked. Teak constitutes more than 60 % of the stock.

SECTION :3.3: SPECIAL OBJECTS OF MANAGEMENT:

3.3.1.1. The forests allotted to this working circle are degraded in quality. Due to various adverse factors which resulted in maltreatment of the forest in the past, these are not in a normal state. At present, the crop is generally young to middle aged. Therefore the prime object of management will be to prepare crop to be managed under SCI in future. Thus the special objects of management of these forest are.

- i) To improve the crop and bring normalcy as soon as possible.
- ii) To check the soil erosion and conserve soil and moisture.
- iii) To restore the quality and density of the forests.

SECTION :3.4: COMPARTMENTS AND WORKING SERIES :

3.4.1.1. 52 Comptts. have been allotted to this Working Circle. The areas have been divided into 6 Working Series having 20 coupes in each Series. Average area of the coupe is 100 ha.

SECTION :3.5: ANALYSIS AND VALUATION OF THE CROP.

3.5.1.1. Stock mapping:- It has been done with the help of satellite imageries. The abstract is included in appendix No. XXV

Age :- The crop is generally young to middle aged.

Density :-It varies from 0.4 to 0.7 along with scattered natural blanks, barren patches and understocked areas.

3.5.1.2. Enumerations:- One percent enumerations have been carried out by SOFR Amaravati and by the field staff of Dy.C.F. (Central Chanda) The results are analysed and the abstract is given below –

Stocking in IMP

Girth	Group-1	Group-2	Group-3	Group-4	Group-5	Total
16-30	21.75	2.99	1.40	5.45	1.09	32.67
31-45	55.97	1.36	1.47	4.41	1.03	64.23
46-60	71.80	1.27	1.05	1.94	1.15	77.21
61-75	70.41	1.90	0.37	1.08	0.73	74.50
76-90	26.94	1.31	0.31	0.62	0.31	29.49
91-105	8.82	0.93	0.28	0.00	0.28	10.31
106-120	2.47	0.62	0.17	0.00	0.17	3.43
121-135	0.00	0.62	0.07	0.00	0.10	0.79
136-150	0.00	0.54	0.15	0.00	0.27	0.97
151up	0.00	0.00	0.00	0.00	0.00	0.00
Total	258.16	11.52	5.29	13.49	5.14	293.59
r1	15.48	18.75	11.74	41.67	23.24	110.87
r2	21.43	27.08	12.52	40.28	31.26	132.57
r3	11.90	12.50	12.88	35.32	20.55	93.15

SECTION:3.6: SILVICULTURAL SYSTEM :

3.6.1.1.To achieve the special objectives of management, "Improvement fellings supplemented by planting and tending of the crop ” shall be adopted.

SECTION :3.7: WORKING CYCLE & HARVESTABLE GIRTH:

3.7.1.1.Working cycle has been fixed at 20 years. Since it is intended to restore to improvement felling only, no regular yield has been fixed. Marking rules are enusaged to remove the trees above exploitable girth as prescribed in SCI and those trees not likely to survive till next felling cycle. Marking will also be a thinning marking and congested poles will be removed to provide space for other trees to grow.

SECTION :3.8: CHOICE OF SPECIES.

3.8.1.1 The species to be favoured in order of preference are Teak, Bamboo, Ain, Bija, Tiwas, Dhawada, Lendia, Rohan, Bhirra & Kalam.

SECTION :3.9: FORMATION OF WORKING SERIES AND COUPES:

3.9.1.1. Area is divided in 6 Working Series. Each Working Series contains 20 coupes having an average area of 100 ha. per coupes as given in Volume II.

SECTION :3.10: REGULATION OF YIELD:

3.10.1.1. The crop is generally young to middle aged. The fellings are limited to improvement of the crop only. Therefore the yield will vary and will consist of small wood, poles and firewood only. Hence no yield regulation is prescribed.

SECTION :3.11: AGENCY FOR HARVESTING:

3.11.1.1. Felling will be done by the department only. However protection and plantation works may be done as per the Govt. directions under J.F.M.

SECTION :3.12: DEMARCATION OF COUPES, PREPARATION OF TREATMENT MAP AND MARKING RULES.

DEMARCATION :- It will be done one year in advance.

3.12.1.1. TREATMENT MAP :- The basic treatment map will be generated in Geomedia unit at Nagpur, which will exhibit the features like steep slope (with slope more than 25°), 20 meter wide width around nallah understocked area, and well stocked area (density between 0.4 to 0.6 and 0.6 and above). The finer details like regeneration status, the group of young pole shall be shown on the map by the RFO and will be checked by ACF. A sample checking will be done by the DCF himself.

TYPE :A: PROTECTION AREAS : i.e.

i) Steep slopes above 25 degrees

ii) Nala banks and river courses 20 meter wide on either side and at the top.

TYPE :B: UNDERSTOCKED AREAS:-These areas will include areas with density below 0.4 including barren lands and natural blanks.

TYPE :C: GROUPS OF YOUNG POLES.

Includes patches of well - grown pole crop of Teak and other species suitable for retention as a future crop. The patch should not be less than 0.5 ha.

IV) Area 'D' - Well Stocked Areas : Includes areas with crop density more than 0.4 Area will be delineated on the basis of site quality.

TREATMENT :-The various treatments proposed are as under. Soil and water conservation works like gully plugging nala bunding and WATs shall be carried out wherever feasible as per the treatment map over the entire coupe area. where ever required.

I Area 'A' : No felling shall be done.

II Area 'B' :-

Teak and suitable miscellaneous species will be planted in well drained areas having good soil depth. There are species, which show the preference for a particular soil. The soil preference is given in appendix no. XXVI , Only one phase plantation has been proposed, as the soil condition are usually good and do not require a restorative measures. Nala bunds and gully plugging works will carried out wherever required

ii) Malformed trees will be cut back .

iii) Singling will be done wherever needed.

III Area 'C' :- No plantation will be done in this area, except CBO will be carried out in a year after main felling . The congested pole crop will be thinned to one third of the height of the dominant pole crop. The crop will be thinned and spaced out.

IV Area 'D' No planting is envisaged.

MARKING RULES:- They will be as below:

TYPE :A: No marking will be done.

TYPE :B:

(k1) All dead trees after retaining 2 trees per ha. shall be marked for felling.

(k2) All live high stumps to be cut as close to the ground as possible and dressed.

(k3) Malformed seedlings to be cut back.

(k4) The established multiple coppice shoots and poles will be reduced to one per stool retaining the vigorous one.

(v) The undesirable under-growth which is preventing or likely to prevent the development of seedling regeneration of the desired species, will be removed.

TYPE :C: Poles will be spaced to a distance of one third of the dominant pole in the patch. All malformed poles will be cutback.

TYPE :D: All dead and malformed trees, all live high stumps and all but one vigorously growing coppice shoots per stool will be marked for felling. In addition to above, the following removals will be affected.

- (k1) All dead trees after retaining 2 trees per ha. shall be marked for felling.
- (k2) All live high stumps to be cut as close to the ground as possible and dressed.
- (k3) Malformed seedlings to be cut back.
- (k4) The established multiple coppice shoots and poles will be reduced to one per stool retaining the vigorous one.
- (v) The matured trees of teak, ain and other important species above 90 cm.girth and trees of other inferior species above 45 cm. girth above will be removed, provided it does not create permanent gaps in canopy. However the fruit trees will be reserved against the felling.

ARTIFICIAL REGENERATION AND CHOICE OF SPECIES :

3.12.1.1. The choice of the species to be planted will depend upon the area suitability of the species and its local demand and will be decided upon in close consultation with the local village communities. The species indigenous to the area like, Teak, Bamboo, Ain, Arjun, Shivan, Chinch, Jaman, Ber, Sitafal, Moha,Neem,Maharukha,Awala,Biba, Anjan, Amba, Apta etc. will be preferred. The chart showing species - Soil preferences is given in appendix No.XLIV. The plantation will be such that no single species will exceed 50% of the planted stock.

SECTION :3.13: SUBSIDIARY SILVICULTURAL OPERATIONS:

3.13.1.1 CBO: In type D areas following operations will be carried out one year after the main felling in the coupes as per the following rules.

- i) All left over established multiple coppice shoots and poles will be reduced to one per stool. Side shoots will be preferred for retention.
- ii) The newly rising multiple teak coppice shoots will be reduced to two per stool, retaining the most promising ones.
- iii)

Cleaning: It will be carried out during the 3rd and the 5th year of the main felling in D type areas as per the following rules:

- i) All inferior species including the undesirable under growth interfering or likely to interfere with the growth and development of seedling regeneration of teak and other valuable misc. species will be cut back.
- ii) Only the most promising coppice shoots out of the two kept previously, will be retained. All other newly risen teak coppice shoots will be removed.
- iii) The established seedling regeneration of teak and other miscellaneous species will be spaced out suitably. All teak coppice shoots found interfering with the growth & development of seedling regeneration of teak & other valuable misc. species will be cut back.
- iv) All climbers other than of medicinal importance will be cut.

SECTION:3.14: OTHER REGULATIONS:

Fire Protection: Main felling coupes will be fire traced and rigidly fire protected for a period of five years from the year of main felling.

3.14.1.1The area will be cleared off, of all the dry and cut remains of bushes, leaves etc. by end of February to avoid fire hazards to standing crop as well as to the NR. Effective protection against fire for a period between February 15 to June 15 is a must to ensure survival and establishment of NR of all species for developing it into the further growing stock. Comprehensive fire fighting scheme will be chalked out.

Closure to grazing and raising of fodder:

3.14.1.2.Main felling coupes will remain closed to grazing for a period of 5 years from the year of main felling.

CHAPTER –IV

WORKING PLAN FOR OLD TEAK PLANTATION WORKING CIRCLE

SECTION: 4.1: GENERAL CONSTITUTION OF THE WORKING CIRCLE :

4.1.1.1. This working circle comprises of old teak plantations of 9204.392 ha area, scattered in all six ranges. Teak plantations (9204.392 ha.) were taken in conversion working circle in previous plans. Besides, some plantations, both of teak and miscellaneous species, were also taken under different schemes in the past. However this working circle includes those areas where teak has been planted by clearfelling the vegetative growth. There may be some admixture of miscellaneous species along with teak. It also includes the area, where teak has been planted in the blanks. The working circle has been created as, such areas require a different management practices. These areas remain neglected in the past, due to lack of definite marking provisions. Therefore, areas included in this working circle are not in a consolidated block rather in scattered patches, spread over in all six ranges. The rangewise statement is since below.

RANGEWISE DISTRIBUTION OF AREA IN OTP WC.

Range	Range area in ha	Area in ha	% of area with respect to range area.	% of the area with respect to w.c. area
Ballarshah	16,038.990	1,138.001	7.09%	12.36%
Dhaba	5,976.138	341.481	5.71%	3.72%
Kothari	13,185.420	1,432.147	10.86%	15.56%
Rajura	10353.110	4,569.073	44.13%	49.64%
Wansadi	48,794.660	596.8	1.22%	6.48%
Wirur	19,961.080	1,126.89	5.64%	12.24%
Total	1,14,309.4	9,204.392	8.05%wrt division	100%

SECTION: 4.2 : GENERAL CHARACTER OF THE VEGETATION :

4.2.1.1. Mostly teak plantations are successful. Site quality varies from IV to II. The area is fully stocked. Crop is uniform. In teak plantations, the subsequent silvicultural operations have been carried out to some extent but not such operations have been observed in plantations of teak and miscellaneous species. The enumeration of trees along with plantations have been given as per compartmentwise in appendix no. XXV volume-II The rangewise distribution of areas allotted to this working circle has been given in appendix no XXVI.

SECTION: 4.3 : BLOCKS AND COMPARTMENTS :

4.3.1.1. The rangewise details of compartments and their areas allotted to this working circle have been given in appendix no XXVI of volume II.

SECTION: 4.4: SPECIAL OBJECTS OF MANAGEMENT :

4.4.1.1. The main objective of teak plantation in conversion working circle was to have the teak crop with growth parameters comparable to those in the yield table. For this, it was essential to follow all silvicultural operations, prescribed in the scheme, after doing plantation which could not be observed meticulously.

- (i) To improve the crop, doing required silvicultural operations so as to achieve growth parameters comparable to those in the yield table.

SECTION: 4. 5: ANALYSIS AND VALUATION OF THE CROP :

4.5.1.1. STOCK MAPS : All Teak plantations have been shown on stock map on 1:15,0000 scale, generated in Geomedia cell, Nagpur.

4.5.1.2. DENSITY : Generally crop is fully stocked.

4.5.1.3. ENUMERATION : 1% line enumeration has been carried out for entire crop of a compartment that also includes old plantations. Enumeration has been carried out with the help of field staffs of Central Chanda Forest Division under the supervision of Deputy Conservator of Forests, Working Plan Division Yavatmal. Compartment wise details of enumeration have been given in appendix no XXV of volume II.

4.5.1.4. AGE AND QUALITY : Plantations taken right from Hussain's, Bhogale's , Khisti's, Kulkarni's and Dr Nandkishor's plans have been included. The site quality varies from IV to II.

SECTION: 4.6: TREATMENT MAP :

4.6.1.1. Treatment map, classifying total area in following three types, will be prepared by the R.F.O. and checked by an A.C.F.

4.6.1.2. TYPE-I: This will include fully stocked areas i.e. the portion of plantation which is successful.

4.6.1.3. TYPE-II: This will include the patches where plantation is failure.

4.6.1.4. TYPE-III : This will include the portion of plantation which is not completely failure rather stem/ha is less than that is required.

SECTION : 4.7 : SILVICULTURAL OPERATIONS :

4.7.1.1. Silvicultural operations will be taken as per types shown on treatment map. Silvicultural operations to be taken are as follows :

4.7.1.2. THINNING : Thinning will be carried out in Type-I and Type-III areas. The thinning schedule for all plantations have been given in Appendix no XXVIII(c) of volume II.

4.7.1.3. The statement showing the distribution of stems in different girth classes for a given site quality and age at an interval of five years have been given in appendix no XXVIII(c) of volume II. This will provide reference for thinning marking. If the difference in number of stems/ha between the actual and those as per yield table is large, the decision for retaining the number of stems per hectare should be taken judiciously. In this case if thinning is done as per yield table, large opening may be created. Teak, being shallow rooted, is susceptible to uprooting by strong winds and therefore, the actual number of stems/ha required have been achieved gradually. To carry out thinning in such plantations weighted average of diameter/girth can be used. To break the monoculture some valuable miscellaneous species, such as Shisham, bija, shivan, ain and fruit trees will also be retained. But the distribution of stems in different girth classes will be maintained as per yield table. In older plantations, the populations will be reduced to the desired number as per the yield table. The deficiency in any girth class should be adjusted from the nearest girth class on the basis of basal area/volume.

4.7.1.4. First thinning will be done in 10th year and second thinning in 15th year and subsequent thinnings will be at an interval of 10th years as per the yield table/stand table of teak. The first thinning should be carried out mechanically to provide space on purely silvicultural consideration. The subsequent thinnings will be executed so that normalcy condition is achieved in the long run.

4.7.1.5. CLEANING : Cleaning will be carried out in all types I, II and III areas. Cleaning schedule for all plantations have been given in appendix no. XXVIII(c) The cleaning operations will be done in next year after thinning. The following operations will be carried out. Climbers will be cut all over the area.

Inferior species interfering or likely to interfere with planted healthy seedlings or healthy natural growth of superior miscellaneous species will be cut.

Superior miscellaneous species will be preferred to damaged teak plants.

Damaged seedlings will be cut.

Coppice growth will be removed.

4.7.1.6. PLANTING : In Type-II area planting with appropriate spacing decided by Deputy Conservator of Forests and duly sanctioned from Conservator of Forests will be carried out after ascertaining the reasons for failure. In case the failure is due to soil condition, no plantation may be affected. Planting will be carried out in the next year of thinning. P.P.O. will be done during the year of thinning

4.7.1.7. PRUNNING : In Type II & III areas pruning of existing sapling/poles will be carried out. This will be carried out annually with the help of watchman in the supervision of forest guard in charge of the area.

SECTION : 4.8 : WORKING CIRCLE :

4.8.1.1. Total area is to be covered under appropriate thinning during this plan period i.e. in 10 years. In new plantations 1st and 2nd thinnings will be carried out in 10th and 15th year respectively and subsequent thinning will be at an interval of 10 years in the teak plantations. In older teak plantations after attaining the age of 50 years thinning will be at the interval of 10 years and shall be B grade thinning.

SECTION: 4.9 : WORKING SERIES & COUPES :

4.9.1.1. Total areas under this working circle will be worked under one working series. Total plantations included in this working circle have been grouped into 10 coupes, not necessary of equal extent of area. Each coupe will be worked every year. Schedule of working in each group have been given in appendix no XXVIII(c) of volume II.

SECTION : 4.10 : METHODS OF EXECUTING THINNING :

Machanical thinning:

4.10.1.1 Teak is traditionally planted at a spacing of 2mx2m i.e. 2500 seedlings per hectare and in ideal conditions, would have required a thinning at a age of 5 years of its formation as at that age, the canopy starts interfering and accordingly, two mechanical thinning of removing alternate rows were prescribed in the earlier text, before the start of Silvicultural C(low) grade thinning. The Indian Forest Record 1957 has prescribed for two mechanical thinnings at plantation age of 5 and 10 years. It prescribed following standard.

Year	No./ha. (for site quality-III	Spacement
1 st year	2500	2mx2m
5 th year	1767 (after 1 st Mechanical thinning of removing alternate digonal)	2x2√2m
10 th year	1250 (after 2 nd Mechanical thinning of removing alternate digonal)	2√2x2√2m

4.10.1.2 It has been found, through the experience, that the teak plantations do not follow the growth in a copy book fashion. The plantation of teak which is supposed to have survived 100% till its 5th year of existence, survives by only 65-75% and the rest of the seedlings are eliminated in its race for survival. The canopy competitions really does not start at this stage. There are limiting factors due to moisture and root completion. Referring to the sigmoid

growth curves of teak, between Age (X) and Volume (Y), it will be observed that the growth follows a moderate slope till 10th year and then picks up a steep growth in next 50 years and hence a first mechanical thinning at the age of 10 years of the plantation has been prescribed. The end result of this thinning would be that the poles in the plantations are free from canopy interference. At this stage, the poles are even saleable.

(1) Demarcation, preparation of treatment map and cleaning:

4.10.1.3 (a) Demarcation: The thinning area should be properly demarcated.

(b) Treatment Map: Described in section 4.6 of treatment map in this chapter

Cleaning: Teak is highly susceptible to root competition and hence it is essential that the thinning area is cleansed of all unwanted root competition. The removal will also allow the productive capacity of soil, distributed in few promising and potential stems rather than distributed in many unpromising stems. The plantation at the stage contains lot of bushes and weeds and these are invariably required to be removed, and therefore, a cleaning of these plantations will be required and rate of such cleaning will be fixed by Conservator of Forests(Territorial). The cleaning of plantation should include the removal of

i) Bushy weeds

ii) Garadi, lendia or any other pioneering species. Trees/poles of spp. Amaltas will not be removed as this is the natural biological parasites of teak- defoliators and teak- skeletonisers Damaged or badly shaped poles/trees will be flushed to the ground.

Climber cutting:- The climber will be cut at two places. The cleaning will be done only in the areas of the plantation, under thinning, as these are usually devoid of under growth, mainly due to closed canopy and often due to un-established allopathic effect wherever it is required. The cleaning may not be required in older plantations.

(2) Procedure for Mechanical thinning:

4.10.1.4 (A) Three Triangular rows will be considered and one out of three poles (if surviving), which is the least promising shall be removed, provided it is not going to leave a permanent gap in the canopy. If one of these three poles, is not surviving no pole will be removed. This way a mechanical thinning will be carried out. While removing coppice shoots, poles of less important economic value, will be removed first. The wolf, forked and poles of less important economic value, will be removed first. The wolf, forked and poles with epicormic branches and deformed poles will be preferred while removing. If the initial survival is 75% , the removal of 1/3 poles will leave nearly 1256 poles after 1st mechanical thinning. At the end of this thinning each pole will have a free canopy around it. The poles will be serially numbered. Those marked for felling will be given the digital number and properly recorded. The marketable poles should be brought to depot for sale. The area should be strictly fire protected. At the stage of its formation, the canopy run parallel and differentiation in the canopy had not started and hence a mechanical thinning is sufficient to provided the growth stimulation. However, at subsequent stage, it will be observed that the canopy starts distinguishing themselves as predominant, co-dominant, dominated suppressed whips and hence all subsequent thinnings will be Silvicultural thinnings and will be of C-grade thinnings. Thinning in good quality may proceed by 2 to 3 years, but in the poorer quality, it should be done at the age of 10 years.

(B) Silvicultural thinning:

This low grade thinning shall be done after 1st mechanical thinning carried out in 10th year of its formation. C-grade ordinary (low) thinning will be carried out. It will require the removal of all diseased, dead and mori bund trees suppressed trees, dominated trees, whips, trees with defective stems and crowns. Only trees with normal crown development and good stem forms should be retained. All coppice crop should be removed, if Silviculturally available and if all coppice crop is required to be retained, it should be of side origin and not

of callous origin. The C-grade thinning includes removal of dominated suppressed, diseased, dead and mori bunds, and also the removal of dominated trees with defective stem and crown. This is needed to promote a mixed undergrowth beneath the crown, so that the soil is protected. When thinning is completed, all crowns should have as far as possible, a clear space all around them. The first Silvicultural thinning will be at the age of 15 years and then after every ten years. However in poor site quality, it may be deferred if it is not corresponding a required basal area at that age with the yield table.

(1)Demarcation, preparation of treatment map and cleaning:

a)Demarcation:

The thinning area should be properly demarcated.

(b)Treatment Map:

Treatment map will be prepared, showing the extent of area, to be thinned, and the understocked area, which is not to be thinned.

(c)Cleaning:

4.10.1.5. Teak is highly susceptible to root competition and hence it is essential that the thinning area is cleansed of all unwanted root competition. The removal will also allow the productive capacity of soil, distributed in few promising and potential stems rather than distributed in many unpromising stems. The plantation at that stage contains lot of bushes and weeds and these are invariably required to be removed, and therefore, a cleaning of these plantations will be required and rate of such cleaning will be fixed by Conservator of Forests (Territorial). The cleaning of plantation should include the removal of –

i) Bushy weeds,

ii) Garadi, lendia or any other pioneering species. Trees/poles of spp. Amaltas will not be removed as this is the natural biological parasites of teak- defoliators and teakskeletonisers. Damaged or badly shaped poles/trees will be flushed to the ground.

Climber cutting:-

4.10.1.6 The climber will be cut at two places. The cleaning will be done only in the areas of the plantation, under thinning, as these are usually devoid of under growth, mainly due to closed canopy and often due to un-established allopathic effect, where ever it is required. The cleaning may not be required in older plantations.

(2)Procedure of carrying out Silvicultural thinning.

The following shall be the procedure of carrying out Silvicultural thinning.

(a)Removal:

4.10.1.7 The average diameter of the crop should be calculated, by taking all trees in plot (5 chain x2 chain). At the time of removal, the maximum number of removal should be from the trees below this average girth. All suppress, dominated and coppice should be removed first, if they are silviculturally available. Trees above the average diameter should be least removed. While removing, non teak coppice irrespective of species will be marked first, followed by coppice teak and then non teak species of seed origin. The fruit trees will not be marked. Subsequently seed origin teak poles/tree above the norms of C-grade thinning of higher diameter should always be retained. This may cause a normal increase in the basal area. The number of trees should be then reduced, but the basal area should be protected. The end result of thinning would be that each tree should have a clear crown around it, but not enough to activate a dormant epicormic shoot.

(b)Subsequent thinning – Third Thinning:

4.10.1.8 Third thinning will be after 25th year of the formation of plantation, and fourth thinning will be carried out at the age of 35 years, i.e. at an interval of 10 years till 65 years. This is done after analyzing sigmoid growth curve, which indicates that the growth is very steep during this period till 80 years and then stablizes to some extent.

(c) Thinning in very old plantation:

4.10.1.9 Heavy thinning should be avoided in very old plantation (Age 60 years) These plantations are near almost to exploitable size and heavy thinning may lead to epicormic branching, which will devalue the timber. Thinning in such plantations should therefore consists of removing all suppressed, dominated trees. Among dominants, only those dominants should be opened, which have got a well developed crown and which is not likely to produce any epicormic branches. In very old plantation, therefore, a light thinning should be carried out.

(4) Cleaning:

A cleaning operation will be carried out in the 5th year commencing from the year of main felling.

i) All climbers other than of medicinal importance will be cut over the whole area of the coupe, if necessary.

ii) Damaged and malformed saplings and coppice shoots will be cut back.

iii) Multiple coppice shoots will be reduced to two or three per stool. Shoots to be retained should be most vigorous, well growth and well spaced. Persistent side branches will be cut 15 cm away from the plant without damaging the stem.

iv) Fast growing inferior species and bamboo interfering or likely to interfere with the reproduction of teak and other valuable species will be cut.

v) In thick patches of teak advance growth and established regeneration of other valuable species, a spacing between saplings to be retained, should vary from 2 meter to 2.59 meter depending on the height growth.

SECTION: 4. 11 : AGENCY FOR EXECUTION :

4.11.1.1. All the operations will be carried out exclusively by the Department under the strict supervision of the Assistant Conservator of Forest and the Deputy Conservator of Forests.

SECTION: 4. 12 : OTHER REGULATIONS :

4.12.1.1.FIRE PROTECTION : Plantation will be rigidly protected from fire taking all measures. Local villagers will have to be taken into confidence to ensure success in this mission.

4.12.1.2.GRAZING : The current thinning coupes will remain closed to grazing for a period of three years from the year of working. The local people will be persuaded to graze their cattle in areas other than closed areas. For co-operation extended by them in protecting area from grazing, they should be allowed to cut grasses from the closed coupes free of cost. Repeated dialogue with local villagers should be continued to have better understanding with them. Besides, the suggestions and measures to control grazing given in Other Important Regulations have been followed.

CHAPTER-V

WORKING PLAN FOR AFFORESTATION WORKING CIRCLE

SECTION: 5.1: GENERAL CONSTITUTION OF THE WORKING CIRCLE :

5.1.1.1. Areas included in this working circle are as follows:

All protected forest areas which have not been planted or having unsuccessful plantation under any scheme, area under Afforestation Working Circle in Dr Nandkishor's plan and not tackled. Areas of miscellaneous working circle of the previous plans and areas taken by division as "Zudupi" jungle for compensatory afforestation.

5.1.1.2. Total area included in this working circle is **22,101.912** ha The distribution of area by ranges is given below:

(Areas in Hectares)

Range	Range area in ha	Area in ha	% of area with respect to range area.	% of the area with respect to w.c. area
Ballarshah	16,038.99	0.00	0%	0%
Dhaba	5,976.138	0.00	0%	0%
Kothari	13,185.42	4,771.944	36.19%	21.59%
Rajura	10,353.11	0.00	0%	0%
Wansadi	48,794.66	16,108.488	33.01%	72.88%
Wirur	19,961.08	1221.48	6.12%	5.53%
Total	114309.4	22101.912	19.34%	100%

SECTION : 5.2 : GENERAL CHARACTER OF THE VEGETATION :

5.2.1.1. Forests included in this working circle are mostly Protected Forests. Compartment No. 530a and 531a included in miscellaneous working circle in Kulkarni's plan are Reserved Forests which was declared Reserved in the year 1983. Also, areas of Bhari Block in Wansadi Range which has been first time taken by division and not covered in the previous plan is Proposed to be Reserved Forest. Since areas included are protected forests and near cultivation and therefore, are almost blank or under stocked. These areas were not brought under management so far and therefore, no silvicultural operations were carried out. Crop deteriorated is to the great extent. Presently, khirni and a few scattered trees are seen wherever there is any vegetation in these forest areas. Due to over grazing the condition of soil is not in a position to regenerate naturally. Special efforts are required to be taken to regenerate these areas. To improve soil condition even ripping of the soil will have to be done. Besides, due to lack of care, demarcation of these areas is not available on the ground from which the extent of encroachment could be assessed.

5.2.1.2. The areas which are in the immediate vicinity of human habitations are under tremendous biotic pressure. Most of the areas in Wansadi and Wirur ranges and some of the areas in other ranges have been encroached upon for cultivation. Due to heavy biotic interference like grazing and illicit cutting for fire wood, the crop has been reduced to scrubby growth. The status of natural regeneration is very poor. The heavy pressure of grazing has resulted in compaction and erosion of soil. Due to this many patches have become almost blank. However, in some patches very good miscellaneous crop of 0.5 density are noticed. Common species found in such patches are bhirra, dhaoda, ain, tinsa, tiwas, lendia, mowai, palas, tendu, bija etc. The area needs soil and moisture conservation and afforestation works.

SECTION: 5.3 : BLOCKS AND COMPARTMENTS :

5.3.1.1. This working circle includes Reserved Forest and Protected Forests, covering an area of **22101.912** ha. The details of compartments allotted to this working circle by working series has been given in appendix no XXVIII (b) of volume II.

SECTION: 5.4 : SPECIAL OBJECTS OF MANAGEMENT :

5.4.1.1. These areas have been degraded due to heavy grazing, illicit cutting and fire. Keeping in view these factors, special objects of management for these areas will as follows :

To reclaim the area by intensive soil and moisture conservation and afforestation works and to enhance the productivity through planting of indigenous species of small timber, firewood and fodder value to meet the local demand.

To involve the local people in afforestation works under the scheme of people's participation in forest management.

To meet the demand of local people for small timber, firewood and fodder to the maximum possible extent.

SECTION: 5.5 : ANALYSIS AND VALUATION OF THE CROP :

5.5.1.1. STOCKS MAPS : The forests except Bhari Block under this working circle have been stock mapped on 1:50,000 scale. These areas were not stock mapped before this plan. The results of the stock mapping has been given in appendix no. XXV. The crop contains mostly middle aged to mature trees.

5.5.1.2. DENSITY : The density of the crop varies from 0.4 to under stocked and blank except a few small patches of density more than 0.4.

5.5.1.3. ENUMERATION : A past Enumeration has been done in these areas and full enumeration is not needed as most of the areas is under stocked, blank and below 0.4 density.

Stocking in OPWC

Girth	Group-1	Group-2	Group-3	Group-4	Group-5	Total
16-30	34.19	14.02	1.47	1.11	6.98	57.78
31-45	23.19	2.87	0.69	0.87	0.82	28.43
46-60	17.61	1.13	0.63	0.69	0.29	20.36
61-75	27.03	1.11	0.38	0.35	0.21	29.08
76-90	27.42	1.59	0.38	0.24	0.13	29.75
91-105	18.45	1.05	0.42	0.07	0.23	20.23
106-120	10.18	1.18	0.35	0.06	0.20	11.97
121-135	4.40	0.59	0.41	0.03	0.11	5.54
136-150	3.77	0.52	0.34	0.00	0.15	4.78
151up	0.00	0.00	0.00	0.00	0.00	0.00
Total	166.24	24.07	5.07	3.43	9.12	207.93
r1	245.83	236.20	30.43	114.12	127.68	754.25
r2	238.51	225.64	31.78	111.32	126.80	734.05
r3	318.80	255.64	32.94	130.23	145.50	883.12

SECTION: 5.6: SILVICULTURAL SYSTEM :

5.6.1.1. The primary object of management in these areas is to restore the soil fertility and increase the productivity. Therefore, intensive soil and moisture conservation works will be taken up and the areas will be afforested with suitable species. No regular silvicultural system will be applied. The existing growth will be tended by suitable operations. The root-stocks present in the area which have been constantly hacked for firewood will be redressed properly to achieve the vigorous growth. The species to be planted in these areas will be decided in consultation with local Gram Panchayat or the Forest Protection Committee by taking into consideration the local requirement. The suitability to the soil shall be the most important factor.

SECTION: 5.7: CHOICE OF SPECIES :

5.7.1.1. The choice of species will depend upon its soil type, depth, drainage and local requirement. However, indigenous species of small timber, firewood and fodder will be preferred. In areas suitable for teak, 50% teak and 50% indigenous edible fruit and flower yielding trees of local economic importance like aonla, biba, harra, beheda will be planted. Ficus species may be planted at the rate of two trees per ha for wildlife. Bamboo will be planted in suitable area in the fourth year of plantation. For the sake of guidance, the species to be planted may be selected from teak, neem, semal, beheda, tendu, shiwan, babul, chinch, moha, aonla, achar, sitaphal bamboo etc. However, the selection of species in general will be the discretion of the Deputy Conservator of Forests. There are species which have shown the preference for the particular type of soil, planting species on these soil will enhance the chance of survival. The evaluation reports as given by C.F. (evaluation) will also form a basis of selection of species in the area. The staff will be explained to identify the different types of soil. The chart is given below.

Sr.No.	Soil type	Suitable species
1	2	3
1	Sandy loam soil	Grewia, Ber, Kala Siris, Albizzia odoratisima, Tamarindus indica, Dalbergia sisoo, Pongamia pinnata, Anthocephalus kadamba, Ain, Shiwan, Teak
2	Clayey loam soil	Kala Siris, Dalbergia latifolia, Pterocarpus marsupium, Adina cordifolia, Mitragyna parviflora.
3	Black Cotton soil	Neem, Soyimida febrifuga (Rohan) Buchanania lanzan, Acacia auriculiformis, Khair, Hiwar (Acacia leucophloes), Acacia nilotica, Kala Siris, Albizzia procera, Dalbergia latifolia, Quercus oogenensis, Lagerstroemia parviflora.
4	Stiff Clay soils	Aegle marmelos, Semicarpus anacardium, Cassia fistula, Cassia siamea, Adina cordifolia, Mahua
5	Riverain soil	Xylia xylocarpa, Dalbergia sisoo, Bombax ceiba
6	Sandy soil	Khair, Terminalia arjuna, Casuarina sp.
7	Hilly tract with good soil	Propolis juliflora
8	Water logged area	Terminalia arjuna, Jamun
9	Hilly tract with poor soil	Ailanthus excelsa, Melia azadirach, Buchanania lanzan
10	Gravelly soil	Rohan, Acacia auriculiformis, Khair, Mahua, Annona squamosa, Dhawada, Bauhinia variegata, Cassia siamea, Terminalia chebula
11	Shallow soil	Sterculia urens, Ailanthus excelsa, Melia azadirach, Khair, Hiwar, Xylia xylocarpa, Bauhinia variegata, Cassia fistula, Cassia siamea, Hardwickia binnata, Dhawada, Terminalia chebula
12	Lateritic soil	Acacia auriculiformis, Xylia xylocarpa, Terminalia belerica, Terminalia chebula, Neem, Karanj, Mahua (oil bearing seeds)
13	Swampy soil	Acacia nilotica, Albizzia procera, Samania saman, Mitragyna parviflora, Terminalia arjuna.
14	Grassy Blank soil	Samania saman, Bombax ceiba.

SECTION: 5.8: FORMATION OF COUPES :

5.8.1.1. Seven Working series have been formed. Each working series will be divided into 30 annual coupes. The sequencing of coups will be from ridge to valley so that watershed development concept will be adhered to. The sequences of working and allotment of compartments to annual coupes have been given in appendix no. XXVIII(b) About 200 ha. will be planted every year.

SECTION: 5.9: REGULATION OF YIELD :

5.9.1.1. Since most of area is degraded, no appreciable yield will be available. However, the small timber and firewood removed during the working may be given either free or at concession rate to the members of Forest Protection Committee if they take up the responsibility for planting and protection of the forest area. Firewood and small timber can be given on nistar to the local people as well, if surplus.

SECTION: 5.10 : AGENCY FOR WORKING :

5.10.1.1. The demarcation, marking and felling will be done departmentally. The small timber and firewood extracted out of the coupe during the felling and subsequent operations will be given to the local people at concession rates. For the afforestation works the committee of local people will be formed. The Forest Protection Committee of local people under the purview of G.R. in respect of people's participation will be formed who will undertake the soil and moisture conservation and plantation works. The protection work is also be entrusted to this committee as per Government Resolution. But the over all supervision will be of the Department. On failure of people's participation or no participation at all the plantation and other allied works will be carried out by the Department.

SECTION: 5.11: DEMARCATION OF COUPE, PREPARATION OF TREATMENT MAP :

5.11.1.1.DEMARCATION : First and second coupes will be demarcated in first year of operation. Rest of the coupes will be demarcated one year before the year of operation of plantation.

5.11.1.2. PREPARATION OF TREATMENT MAP : Soon after demarcation of the main working coupe a treatment map will be prepared, after thoroughly inspecting the area by the RFO and will be verified by the ACF. The maps provided of Geomedia cell will show, protection Area, under stocked and fully stocked area. The patch of advanced growth will have to be demarcated. The treatment map will show the following areas distinctly.

5.11.1.3.TYPE A :- PROTECTION AREA : This will include :
Steep slopes above 25°.

20 meter buffer on either side of well defined nala banks and river courses. Groves around temple or worship place.

5.11.1.4.TYPE B :- UNDER STOCKED AREAS : All areas upto 0.4 density including blanks.

5.11.1.5.TYPE C :- Groups of young poles.

5.11.1.6.TYPE D :- WELL STOCKED AREAS : Well stocked areas with density above 0.4.

5.11.1.7. To facilitate the preparation of treatment map each coupe will be divided, in general, into four sections. Each type of area will be marked only if its extent at one place is more than 2 ha. The treatment map will be submitted by the RFO to the Deputy Conservator of Forests through Assistant Conservator of Forests. The Deputy Conservator of Forests will get it checked through Assistant Conservator of Forests and a few by himself as a test case. After careful scrutiny, the same will be approved by the Deputy Conservator of forests and will be sent to the RFO. No area will be treated as unworkable as some kinds of work will be required in each type of area mentioned above. A basic treatment map showing these four classes will be provided by Geomedia cell at Nagpur. In this working circle major area will fall under type (B).

5.11.2.1.MARKING RULES : Marking technique is described in detail in Other Important Regulations. Marking rules for each type of area besides climber cutting and tending of naturally regenerated seedlings will be as follows :

5.11.2.2.TYPE A :- PROTECTION AREAS : No tree will be marked for felling in these areas.

5.11.2.3.TYPE B : UNDER STOCKED AREAS : (1) All dead trees will be marked for felling, after retaining two dead trees per ha. The retention of two dead trees will be from inferior species as far as possible.

All live high stumps will be marked for felling.

All the marking shall be verified by the RFO before commencement of works.

5.11.2.4.TYPE C : In this area thinning marking of advanced girth will be done so as to a distance of 1/3 of the top height of dominant crop.

5.11.2.5.TYPE D : WELL STOCKED AREAS : In this area, edible fruits and flower yielding trees will be reserved. The dead trees will be marked for felling, after retaining two trees per ha for the purpose of wildlife. The retention of two dead trees will be from inferior species as far as possible. Only 30% of the trees above exploitable girth, according to SCI rules, shall be removed. The removal of the trees shall be from the higher girth class. No plantation has been prescribed. The felling will open the canopy to induce regeneration. Dead trees will be removed having two per hectore.

E. Note :- A tree will be considered as :-

Dying : When it has more than one third of its crown dead:

Unsound : When its bole emits a hollow sound when struck with the back of the axe or when it has not got any marketable timber:

Malformed : When it is defective or abnormal either in crown, or bole, and includes conditions like stagheadedness, gnarl, twists, or constrictions by climbers beyond recouplement or crookedness etc.

Otherwise defective : Means of conditions other than the above such as heavily burnt by fire at its base and likely to fall down within a couple of years with general cavities dug in its stem for taking cut honey or has many ant-poles or fungus, rots or other diseased portions.

SECTION: 5.12 : SOIL AND MOISTURE CONSERVATION :

5.12.1.1. Soil and moisture conservation works will be taken all over the area along with the marking and will be completed before the onset of monsoon in next year. The details of these works has been given in Other Important Regulations.

REGENERATION :

5.12.1.2. The artificial regeneration mainly will be resorted for regeneration of the area as major area is under stocked and degraded. However, natural regeneration through coppice and natural seedling will be treated as supplementary to artificial regeneration in the case of afforestation of degraded areas and will be properly tended. In case the area to be afforested is the area already planted earlier, the reasons of failure of plantations will be examined and unless the factor responsible for such failure have been eliminated, no area will be planted.

5.12.1.3.(I) COPPICING : After felling is over, the stools will be dressed at 10 to 15 cm height above the ground with a sharp axe. This will encourage side shoots.

5.12.1.4.(II) ARTIFICIAL REGENERATION : Soon after the receipt of approved treatment map for marking a detailed treatment map for planting will be prepared by the RFO under the guidance of an ACF in consultation with Forest Protection Committee, formed for the afforestation works. The treatment map will show the following details in aforesaid types of areas.

5.12.1.5.TYPE :A and C : Areas suitable for Bamboo planting. Seed sowing of neem, Maharukh will be restored to. In good soil the stump planting of sisoo will be carried out.

5.12.1.6.TYPE B : Areas suitable for various types of plantations along with good soil depth. Not more than 200 ha. of such area will be planted in a year. The plantation will be in a single phase.

5.12.1.7.TYPE D : Areas suitable for bamboo planting and gap planting of teak and miscellaneous species along with the good soil depth. The minimum area for gap planting will be 5 ha

5.12.1.8. The treatment map will be completed along with the marking. After preparation of treatment map, the availability of area for various types of planting including fodder and grass will be discussed with the local committee for afforestation and the species to be planted in various types of areas will be finalized. Bamboo planting will be done in all suitable areas in the 4th year of planting.

5.12.1.9.(III)BOOSTING NATURAL REGENERATION : Methods suggested in Other Important Regulations should be tried.

SECTION: 5.13 : PLANTING TECHNIQUE :

5.13.1.1. BAMBOO PLANTING: Bamboo planting in all suitable areas will be done. Besides, interplanting in 4th year from the year of planting at the spacing of 6m x 6m in pits of size 45 cm x 45 cm x 45 cm. *Dandro calamus strictus* will be planted.

5.13.1.2. PLANTING OF TEAK AND MISCELLANEOUS SPECIES : The planting will be taken in the next year of main working with spacing of 2m x 2m for both teak and miscellaneous species. Planting of teak with standard technique and that of miscellaneous species in pits of size 30 cm x 30 cm x 30 cm will be followed. Raising teak in root trainer will be preferred. The plantation technique has already been standardised. In all 2500 seedling will be planted each ha. Local species will be preferred. The choice of species shall be according to its likely success.

5.13.1.3.PLANTING OF GRASS : Planting of grass will be taken in the year of planting itself either through seed sowing or through tussocks planting. The details of planting technique has been given in the miscellaneous regulation. Introducing sabai and khus grasses can be thought of. The details of planting of sabai grass has been given in Non Timber Forest Produce Working Circle.

5.13.1.4. Seed sowing of suitable species should be done over the mound of contour trenches. The choice of such species will be based on site and soil of the site and solely on the discretion of DCF with consultation of local people. Besides, seed sowing of *Dhencha* (*Sisbania acualata*), *Glaricidia*, *Jatropha* and grass can be taken on mound. The root sucker will be encouraged by injuring the root system of such species.

SECTION: 5.14 : SUBSIDIARY SILVICULTURAL OPERATIONS :

5.14.1.1.The following works will be carried out in the next year of main working and in the subsequent years.

5.14.1.2.CUTTING BACK OPERATION.

All standing trees and live high stumps marked for felling but not felled will be felled.

All trees damaged during main working which are not likely to recover will be felled.

All climbers except of medicinal values will be cut.

Dressing of stumps will be done.

5.14.1.3.CLEANING : In the sixth year from the year of main working the following operations will be carried out :

Climbers will be cut all over the area.

Inferior species, interfering or likely to interfere with natural growth as well as planted seedlings, will be cut.

Damaged seedlings or trees damaged by wildlife and illicit cutting will be cut.

Coppice shoots on each stump will be reduced to one vigorous shoot.

5.14.1.4.THINNING : Though 1st thinning is carried out in the 10th year of main felling, however, it depends on the proper growth of seedlings and accordingly decision will be taken by the Deputy Conservator of Forests in consultation with the Conservator of Forests. In the 10th year, from the year of main working following works will be carried out.

Climbers will be cut all over the area.

All dead trees or badly damaged trees will be felled.

Coppice shoots on each stumps will be reduced to one vigorously growing shoot.

The sequence of subsidiary silvicultural operation has been given in appendix no XXVIII(f) of volume II of this plan.

SECTION: 5.15: OTHER REGULATIONS :

5.15.1.1.FIRE PROTECTION : Main working coupes will be rigidly fire protected for a period of five years from the year of main felling. If possible, the local Forest Protection Committee will be made responsible for this work. Fire tracing will be done in plantation areas. To control fire suggestions and measures given in Other Important Regulations will be followed.

5.15.1.2.GRAZING : Areas of main working coupes will remain closed to grazing for a period of five years from the year of planting. To control grazing suggestions and measures given in Other Important Regulations should be followed.

5.15.1.3.The local people should be made aware of the importance of protection of the area from fire, grazing and illicit cutting. Unless the area is regenerated and strictly fire protected no meaningful results can be achieved. For this purpose, regular camps should be arranged of the local afforestation committee to explain to the people about the benefits of afforestation and the importance of the protection.

CHAPTER VI

MISCELLANEOUS WORKING CIRCLE

SECTION:6.1: OTHER REGULATIONS

6.1.1.1 The area of this Working Circle is 5052.545 ha. and it includes the Park area, leased area ,disputed Border area At places the vegetation is good, but these area cannot be brought under any silvicultural system, due to its preassigned reasons and hence have been included here. There is a need to settle the area falling in disputed territory of this working circle.

RANGEWISE DISTRIBUTION OF AREA IN MISC. WC.

Range	Range area in ha	Area in ha	% of area with respect to range area.	% of the area with respect to w.c. area
Ballarshah	16,038.990	0	0%	0%
Dhaba	5,976.138	0	0%	0%
Kothari	13,185.420	0	0%	0%
Rajura	10353.110	0	0%	0%
Wansadi	48,794.660	2152.378	4.41%	42.60%
Wirur	19,961.080	2900.167	14.53%	57.40%
Total	1,14,309.4	5052.545	4.42%wrt division	100%

CHAPTER – VII

WORKING PLAN FOR BAMBOO (OVERLAPPING) WORKING CIRCLE

SECTION: 7.1: GENERAL CONSTITUTION OF THE WORKING CIRCLE :

7.1.1.1. This working circle includes all types of areas where bamboo is present in workable quantity. Workable means that there are sufficient bamboo clumps which require independent working usually the presence of 8 clumps per ha. is considered as workable. Area with scattered bamboo have not been included in this working circle. These areas will be covered under irregular harvesting. The area of the working circle is spread over Ballarshah and Kothari Range of the tract. The area extent and a rangewise distribution of area has been given below.

RANGEWISE DISTRIBUTION OF AREA IN BOMBOO (OVERLAPPING) WC.

Range	Range area in ha	Bamboo Area in ha	No. of Compartment
Ballarshah	16,038.990	11268.876	60
Dhaba	5,976.138	0	0
Kothari	13,185.420	975.722	25
Rajura	10353.110	0	0
Wansadi	48,794.660	4555.794	47
Wirur	19,961.080	3753.089	33
Total	1,14,309.4	20553.481	165

SECTION: 7. 2 : GENERAL CHARACTER OF THE VEGETATION

7.2.1.1. The general character of the vegetation in the area included in this working circle has been described in the respective working circles. Only the condition of bamboo in this tract has been described here. Species of bamboo commonly found is *Dendrocalamus strictus*, locally known as manvel. It is also known as male bamboo. This species is found almost everywhere either planted or naturally occurring. The concentration of bamboo in Ballarshah, Kothari and Wirur Ranges is more. The gregarious flowering of bamboo took place in the year 1984 in Ballarshah and Kothari ranges and in 1986-1988 in Wirur and Rajura ranges. Excellent natural regeneration came up but it could not be given required silvicultural treatment due to which clump formation started slowly and is in progress in some areas. Bushy growth of bamboo is seen in some of the forest. It appears that if it is left as such clump formation will not take place in the near future, due to paucity of stored food material, enough to accelerate culm formation. Therefore, to boost up establishment of clump formation, appropriate silvicultural operations are required to be initiated without loosing further time.

7.2.1.2. *Dendrocalamus strictus* is the only species of bamboo occurring in the tract. It is found in north eastern hilly areas on the gentle slopes. Bamboo forms undergrowth in better quality areas. Difference in quality and growth of bamboo and frequency of its occurrence are noticed due to variation in soil, altitude and drainage. *Bambusa arundinacea* (Katang Bamboo) is rare and is usually planted. it is found in the moist locality.

SECTION:7.3: LOCAL AND COMMERCIAL DEMAND :

7.3.1.1. Bamboo is used in a variety of ways by the local Tribals and “Burads”. Burads make tattas, baskets and so many other articles of bamboo. Local Tribals use bamboo in hut construction, temporary walls of hut, compound fencing, cattle shed etc. Apart from local demand there is heavy commercial demand of bamboo.

7.3.1.2. Local demand for bamboo is very high, considering the population and variety of its uses. There is a vast gap between demand and supply of bamboo in this tract. Presently, village communities are being supplied bamboos by bringing them from other Divisions for bonafide use. Crop being young, harvesting of bamboo in this tract is not possible for the present. With a view to utilize the optimum potential of bamboo forests, it's working must be on scientific and silvicultural lines.

7.3.1.3. To protect rights of the villagers and make them enjoy their rights properly a provision need be made in terms and conditions of lease that lessee should make available bamboos for bonafide domestic and village industry's requirements, at a place and within given period of time as specified by local Range Forest Officer. The department should do exhaustive exercise to assess the village and familywise bonafide requirements of the local people and the period during which it is required.

7.3.1.4. Accordingly, the nistar will be distributed by the Forest Department well in time to the local people as per directives issued by the Government from time to time. In case there is delay in supply of bamboo by the lessee, then the Conservator of Forests should issue necessary order to the Deputy Conservator of Forests regarding harvesting of the bamboo from the due coupes.

SECTION: 7.4 : BLOCKS AND COMPARTMENTS :

7.4.1.1. No blocks have been formed. In Ballarshah, Kothari and Wirur, Wansadi tract in all 181 compartments are having bamboo with a total area of 47586.656 ha. Out of this 16 compartments were transferred to FDCM and the net area left with the Department in this Working Circle is 43542.628 ha covered under 165 compartments. Areas included in this working circle is exclusively Reserved Forests. The following statement shows the name of felling series, total number of compartments allotted and the area of each felling series.

BALLARSHAH, KOTHARI RANGES:

Sr. No.	Name of F.S.	Name of Comptts with forest Dept.	Area in ha With Forest Deptt.	Area under bamboo	No.of com. With FDCM	Area in ha of comptt. With FDCM
1.	<u>Kothari Range</u> Karanji	5	755.144	147.709	3	598.53
2.	Bhutari	14	1465.371	358.983	8	1876.935
3.	Jharan	6	911.757	469.03	5	1568.563
1.	<u>B'shah Range</u> Ballarshah	50	9519.83	9515.78	-	-
2.	Junona	10	1753.096	1753.096	-	-
1	<u>Wirur Range</u> Garlapeth	9	3175.731	733.637	-	-
2	Siddheshwar	8	3709.395	1349.569	-	-
3	Dewada	16	5268.852	1669.883	-	-
1	<u>Wansadi Range</u> Chandur	20	7071.152	1777.979	-	-
2	Wansadi	19	6553.847	1381.250	-	-
3	Sawalhira	8	3358.453	1396.565	-	-
	Total	165	43542.628	20553.481	16	4044.028

The allotment of compartments to felling series will be given in Appendix no XXVI. In case of Rajura, Wansadi and Wirur ranges the bamboo clump formation is yet to be completed.

Unfortunately in the current plan no specific stress is being given in treatment of young clump so that clump formation may be expedited. The extent of area in the compartment and their distribution will be given in appendix no XXVI.

7.4.1.2. Bamboos are used for mats, partitions, baskets, rafters, roofing, fencing and for such other purposes by the local population. In view of the increased local demand for nistar, felling series have not been divided into nistar and commercial felling series. On harvesting the coupe either by Department or lessee first nistar requirement should be met and the balance should be supplied to or taken by the lessee.

SECTION: 7.5: SPECIAL OBJECTS OF MANAGEMENT :

7.5.1.1. The special objects of management of this working circle are as follows :

To boost up clump formation.

To harvest bamboo from all over area scientifically to get the optimum sustained annual yield.

To meet the nistar demand of the local population and commercial demand of village industries.

To meet the growing demand of bamboo based industries.

To improve the crop to increase the productivity of the areas.

SECTION: 7.6: METHODS OF TREATMENT :

7.6.1.1. Since crop is young and clumps are yet to form, in general. Therefore, in the first phase efforts will be made to boost up clump formation. Harvesting will be done as per the standard method given in **Section -9.11**. The crop will be treated on clump basis i.e. each clump will be treated independently as per the requirement.

SECTION: 7.7: CUTTING CYCLE:

7.7.1.1. The harvesting of bamboo will be done on a cutting cycle of 3 years. Each cutting series will be divided into 3 coupes, viz A, B and C and one of the coupes from each cutting series will be worked annually. Allotment of compartments to the different coupes and sequence of felling will be given in Appendix No. XXVIII (e).

SECTION: 7.8: ANALYSIS AND VALUATION OF THE CROP :

7.8.1.1. STOCK MAPPING : The bamboo areas have separately been stock mapped. Details of bamboo bearing areas will be given in Appendix No. XXVI.

7.8.1.2. ENUMERATION : 1% line plot sampling method has been adopted. In each sample plot, all clumps have been counted and in the area of regeneration survey all bamboo cutting have been counted meticulously. The results of enumeration has been given in Appendix No. XXV

SECTION: 7.9 : IDENTIFICATION OF AGE OF BAMBOO :

7.9.1.1. Since the marking of bamboo is highly selective, it is necessary to distinguish current year, previous year and mature culms from one another.

7.9.1.2. CURRENT YEAR : Culm sheath is present on lower half of the culm, branches are present throughout the length of the culm and bloom (white powdery dust) is present abundantly and comes off easily when touched.

7.9.1.3. SECOND YEAR : Culm sheath absent, branches are present practically at all nodes. Bloom is patchy and does not come off easily.

7.9.1.4. THIRD YEAR : Culm sheath absent, branches are present practically at all nodes, white bloom is absent and it becomes blackish grey.

SECTION: 7.10: AGENCY FOR HARVESTING :

7.10.1.1. The commercial felling series were being harvested by BILT, Ballarshah. Since there is heavy local demand of bamboo, therefore, all coupes shall be worked by any one Agency as per norms decided by the Government. Government may decide single agency both for commercial as well as nistar bamboo felling series.

SECTION : 7.11: METHODS OF EXECUTING THE TREATMENT

7.11.1.1. The coupes due for working will be demarcated in April/May (before the onset of monsoon) in the year in which they become due for harvesting by erecting poles at suitable intervals. On the poles, compartment number, coupe number and name of cutting series will be written.

7.11.1.2. Soon after the demarcation, the entire coupe due for working will be thoroughly inspected by the R.F.O and 10% checking will be done by an A.C.F. The inspection will be carried out compartment wise and the area containing bamboo will be shown on the map. In this area sample enumeration of bamboo will be done and on its basis, estimate of bamboo clumps will be made. As per the enumeration the estimate of various works and yield of bamboos will be made.

SECTION:7.12 : METHODS OF WORKING :

7.12.1.1. The methods of working will be different for both regeneration and established clumps as given below :

7.12.1.2.FOR REGNERATION : Following operations will be carried out to boost up clump formation of regeneration in the area which flowered in the year 1984 or 1986-88.

Healthy, vigorous and promising bamboo seedlings @ 300 to 400 per ha are to be identified. Around identified seedlings, a radius of 1 metre will be cleared off all other seedlings even of bamboo other than identified one. Soil of the cleared areas will be ripped and roots of other species if existing will be taken out. On the periphery of the cleared area a circular trench of width 30 cm and depth 20 cm will be dug and dug up soil will be heaped on root of the identified seedlings. On slope half moon shaped trench of above specification will be taken instead of circular trench. Every year, individual fire tracing will be taken till the establishment of the clumps. Thinning and cleaning will be carried out annually till the formation of clumps.

FOR ESTABLISHED CLUMPS :

- (i) No harvesting works should be permitted between 15th June to 30th Sept.
- (ii) No clump should be considered fit for harvesting unless it contains more than 12 mature culms (one year as well as more than one year old culms but having among them some culms at least two years old).
- (iii) No culms below the age of two years will be felled.
- (iv) Following culms shall be removed from all clumps;
 - (a) All dead, decayed and dry bamboos.
 - (b) Culms whose half or more top part is broken or damaged.
 - (c) Twisted or malformed culms.
- (v) In a mature clump the following types of culms (Green and living) will be retained :
 - (a) All culms below age of two years.
 - (b) From the culms of age more than one year, equal in number to the current season's (i.e. less than one year old) culms or 12 whichever is more. The remaining culms will be considered available for harvesting.
- (vi) Culms should be cut 15 cm to 45 cm above ground level i.e. above the first internode above the ground with a sharp instrument. The cut should be slanted. This to avoid drying of bamboo rhizome by capillarity.
- (vii) In case of any flowering, no culm from flowered clump shall be felled in the year of flowering.
- (viii) Harvsting of bamboos shall be done in a manner so as to ensure that the retained culms are evenly spaced and that some mature culms i.e. more than two years old are retained on periphery for the purpose of support to the new culms.
- (ix) Following acts will be strictly prohibited:
 - (a) Digging of rhizomes.
 - (b) Lopping of bamboo culms for fodder.
 - (c) Use of tender bamboo culms for bundling.
- (x) Climbers interfering with growth of bamboo clumps shall be cut.

(xi) After cutting, the debris will be removed away from the clump and will be stacked at a distance not less than 2 m from the outer periphery of each clump.

Cutting should be supervised by forest officers knowing the rules of felling.

SECTION: 7.13: BAMBOO FLOWERING AND TREATMENT TO GREGARIOUSLY FLOWERED AREA :

7.13.1.1. The gregarious flowering in the tract dealt with happened in the year 1984 and 1986-88. During this plan there is no chance of it occurring again in the next. But operations necessary to be followed after flowering are required to be known. Therefore, operations to be followed in sequence are given hereunder :

7.13.1.2. Since in gregarious flowering all bamboos dry simultaneously and as dry bamboo is vulnerable to fire hazard, its quick removal is essential. But the volume of work is so much that to carry out this operation advance planning and preparation is essential. As soon as the gregarious flowering occurs in any locality its extent should be found out and recorded in the compartment histories and also in the "Divisional Note Book". The same will immediately be reported to the Conservator of Forests, Silviculturists and Deputy Conservator of Forests, Working Plan-II. As soon as bamboo starts flowering gregariously, the entire area will be effectively closed to grazing and strictly fire protected for a period of 8 to 10 years from the year following the year of flowering, so that the seeds falling on ground could germinate, germinated seedlings could establish and clump formation could start. The dry culms after seeding should be cut and disposed of as soon as possible.

7.13.1.3. After seeding profuse regeneration of bamboo comes up in the following monsoon. It takes nearly 8 years for new regeneration to reach the harvestable size, but often it takes considerably more time if proper tending operations are not carried out on time.

COLLECTION OF SEEDS AND ITS DISPOSAL :

7.13.2.1. The fresh seed of bamboo will be collected from clumps. The seed so collected will either be sent to the silviculturist for storage and further distribution among various divisions or be used locally as per the requirement. Since the ability of these seeds is very short, these should not be stored for a long.

TENDING OPERATIONS :

7.13.3.1. After completion of seeding it is essential to properly look after the young regenerated crop till the start of clump formation. The following operations will be carried out in the natural regeneration of bamboo.

CROP OF AGE BETWEEN 1 AND 3 YEARS :

7.13.3.2. During this period the area will normally contain thick seedlings crop and the clump formations does not start. For timely formation of clumps the following tending operations will be carried out. The area will be thoroughly gone over and 0.8 m diameter focii, at the rate of 300 per ha distributed evenly over the whole area will be formed.

All the rank growth of grasses, weeds and even bamboo seedlings upto a distance of 1.5 metre all around the focii formed as above, will be cleared so that the growth of the bamboo seedlings in the selected focii is not hampered. All climbers within and around the focii upto 1.5 metre distance will completely be removed. The whole area will be strictly protected from fire and grazing.

CROP OF AGE BETWEEN 3 AND 8 YEARS :

7.13.3.3. During this period clump formations starts but the crop is yet immature for harvesting. During this period following operations will be carried out.

- i) All badly grown, twisted and damaged culms from the selected focii will be removed.
- ii) All weeds, grasses and climbers, within and around the focii upto a distance of 1.5 metre will be completely removed.
- iii) Tree growth of species, other than teak, ain, shisham, bija, tinsa, tiwas, dhawada, haldu, kalam, semal, mowai and bhirra over topping the clumps will be removed.
- iv) The whole areas will be strictly protected from fire and grazing.

CROP OF AGE ABOVE 8 YEARS :

7.13.3.4. When the crop age is 8 years, the clump formation is normally completed and clumps are mature enough for harvesting. The treatment during this period will be of the nature of harvesting-cum-tending. The felling rules, already described in the earlier paragraphs, will be applied.

Area with switchy growth:- There are large extent of areas, where the bamboos have been well established but growth is switchy due to insufficient food. These areas are to be left as such, till such time, when these clumps gather enough stored food to produce a healthy and a marketable culm.

SECTION: 7.14: CYCLE OF TENDING OPERATIONS :

7.14.1.1. The operations, as prescribed under (A) or (B) above, will be carried out annually. When it is not possible due to administrative reasons, these operations, except fire protection, will be carried out alternate years or at the most in a cycle of 3 years. This will be decided by the Conservator of Forests. The fire protection will be carried out every year and the grazing will remain closed till completion of clump formation.

SECTION : 7.15 : INJURIES DUE TO INSECTS AND THEIR CONTROL :

7.15.1.1. The insects known to attack the bamboo culms are *Estigmina Chinensis* (Chrysomelidae colioptera) which attacks new culm and make galleries inside the inter nodes. *Cryptotrachelus longipes* which is responsible for destroying the growing terminal bud causing branchy growth. The damage caused by insects are not reported so far in this tract.

7.15.1.2. The attack of these insects can be controlled by taking up the following measures :

- i) All the infected culms will be cut and burnt during winter when the insects hybernate.
- ii) To cause light ground fire run through the infected areas in winter as the insects hide under the debris and taking advantage of the insectivorous birds.

SECTION : 7.16: OTHER REGULATIONS :

7.16.1.1. FIRE PROTECTION : The new shoots of bamboo are badly affected by fire and therefore, bamboo area will be protected completely from fire.

GRAZING : In flowering areas grazing will be strictly prohibited.

7.16.1.2 J.F.M. – The best method of treating the area with the switchy growth is to get the work done through JFM committee. The members of these committee may be allowed to remove the switchy growth of bamboo from the inbetween the spacing left out. After the formation of focii of radius 1.0 meter at the interval of 1.0 meter, the inbetween growth will be removed. The switchy growth removed shall be used for their self use. These works will be done under the supervision of a forest guard.

CHAPTER – VIII

WORKING PLAN FOR NON-TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE

SECTION : 8.1 : GENERAL CONSTITUTION OF THE WORKING CIRCLE:

8.1.1.1. This is an overlapping working circle covering the entire forest area of the tract dealt with. Thus the total forest area included in this working circle is 114309.4 ha. This working circle is in recognition of the growing values to non timber forest species basically the plants of medicinal importance and other minor forest produce like tendu etc. These species are basically traded locally. There is not much revenue realised by the Government except for tendu , but there is substantial return to the tribals.

Range	Range area in ha
Ballarshah	16,038.990
Dhaba	5,976.138
Kothari	13,185.420
Rajura	10353.110
Wansadi	48,794.660
Wirur	19,961.080
Total	1,14,309.4

SECTION: 8.2 : NON TIMBER FOREST PRODUCE OF THE TRACT :

8.2.1.1. There are numerous Non Timber Forest Produces available in this tract and are found in almost all ranges with varying extent. Tendu and Bamboo contribute a sizeable revenue to the State exchequers other produce generate employment for local people during their lean season. These play an important role in rural economy.

8.2.1.2. The important Non Timber Forest Produces, found in this tract are Moha flower and Fruits, Bamboo, Tendu, Myrabolons, Gum, Broom, Grass etc. The stems per hectare and their distribution in different girth classes by range of a few important such species will be given in Appendix no. XXVI As a matter of practice only timber species of medicinal importance is enumerated by the forest survey units. The non timber species is usually ignored . The reliable data of its quantum of presence is unknown. There is also destructive mode of its harvesting with the result, there abundance has decreased considerably .

SECTION : 8.3: SPECIAL OBJECTS OF MANAGEMENT :

8.3.1.1. As per the National Forest Policy, 1988 the development of Non Timber Forest Produce (NTFP) has been one of the objectives in the forest management. Therefore, consistent with the above policy, the special objects of management decided are as follows :

To manage NTFP scientifically to utilise the existing potential optimally and thereby to enhance the productivity and production of the same.

To take measures for its sustained yield.

To generate employment for local people thereby improving their financial status through participatory management.

To provide better and improved quality of life and culture supporting items to the local people.

SECTION : 8.4 : METHODS OF TREATMENT :

8.4.1.1. The treatment to be given will be different for different types of NTFP. Therefore, each NTFP will have separate treatment as follows :

MOHA :

8.4.2.MOHA FLOWER :

8.4.2.1.USE AND NUTRITIVE VALUE : Moha flower is a rich source of sugar, vitamins and calcium. The flower, in its ripe form, has almost 73% sugar and is, therefore, even a better medium for fermentation than grapes. Moha flower is eaten raw or cooked. This is eaten also after frying or baking into cakes. More usually, the corolla tubes, after removing the stamens, are boiled for about 6 hours and left to simmer until water evaporates completely. The odour disappears as a result of cooking and the material becomes soft and jelly like. It is eaten with rice, tamarind, sal seeds, grains or other food or as sweetmeat. Dried Moha flower is also boiled with rice and mixed with wheat flour and this provides a wholesome food. After drying, it becomes valuable food additive to diet. Moha flower is largely used in the preparation of distilled liquor also. This liquor is actually the beer of India having strong smoky foetid odour which disappears on aging. It is reported to excite gastric irritation and produce other adverse effects. Redistilled and carefully prepared liquor is good quality without having adverse effects and closely resembles to Irish Whisky. The corollas were, in the past, exported, to France for distillation of cheap brandy. However, the French Government in order to protect their home industry prohibited the import of the same. Subsequently, it was imported by Europe for feeding pigs.

8.4.2.2. Moha spirit prepared by distillation of liquid containing fermented moha flowers is the most important alcoholic drink in many of the areas. It makes a potent drink and efforts are required to be made to refine it in modern distilleries. The flower is also used for the preparation of certain kinds of non-alcoholic food drink by some tribes. The flower is also used for the preparation of vinegar. Moha having appreciable proteins and vitamins has valuable nutrition content.

8.4.2.3. A syrup of good quality is prepared from the corollas by extraction with hot water clarification with activated charcoal and evaporation under vacuum. The syrup with very high sugar content (61%) has a golden yellow colour with the odour of fresh flower. It is a substitute for honey. Apart from human consumption, moha flower offers an excellent food to the livestock and wild animals as well.

8.4.2.4. Nutrition analysis of flower showed digestible crude protein 3.08 %, total digestible nutrients 73.7% and starch equivalent to 55.1 % . The flesh of animals particularly of pigs, fed on moha flowers, acquires a delicate flavours.

8.4.3.MOHA FRUIT :

8.4.3.1.USE AND NUTRITIVE VALUE : A ripe fruit has cream coloured epicarp, which is edible. Moha berries were eaten raw or cooked. They are also eaten by cattle, sheep, goats, monkey and parrots. They have medicinal value as well. Fruits felled on the ground are easily attacked by insects and ants thus becomes unfit for human consumption.

8.4.3.2. The moha seed yield oil. A thick oil light yellow in colour and extracted from the seeds, is used by forest tribes for cooking purpose, as an illuminance and hair oil. It is also used in the manufacture of soaps, particularly, laundry chips. In many areas it is also used as an adulterant for 'Ghee' for which it is clarified with butter mark to mask the disagreeable colour. The oil finds use in medicines also.

8.4.3.3. Crude oil has a deep colour, high acidity, unpleasant odour and bitter test. Refining and hydrogenation yield product similar to mutton tallow or cocoa butters. Oil having acid value below 13 may be refined by treatment with caustic soda and that with higher acid value is extracted with alcohol and further treatment with alkali. Refined oil finds use in the manufacture of lubricating grease and fatty alcohol. The oil is also used for candles, as a batching oil in Jute Industry and as a raw material for the production of stearic acid.

8.4.3.4. The yield of oil from the seeds depends on the efficiency of the equipment's employed for crushing them. It is 20-30% of the weight of the kernels when crushed in 'Ghanis', 34-37% in expellers and 40-48% when extracted by solvents.

8.4.3.4. Moha oil should have a set of characteristics. For this purpose ISI standards have been prescribed which are as below :

MOHA OIL PROPERTIES:

Grade				
Sr.No.	Characteristics	I	II	III
1.	Moisture and insoluble impurities% by mass max.	0.10	0.25	0.50
2.	Color in a 1/4 in a cell on the Loviband scale expressed are Y + 5R not deeper than.	0.20	30	50
3.	Refractive index at 40°C	1.459	to	1.460
4.	Sp.gravity at 90°F /30°C	0.862	to	0.875
5.	Saponification value	187	to	196
6.	Iodine value	58	to	70
7.	Unsaponification matter % by mass	2.0	3	3.0
8.	Acid value max	0.5	20.0	>20

8.4.3.5.YIELD : Moha trees starts bearing flowers and fruits between 10th to 15th years of planting. A study with reference to the yield of moha flowers and fruits has been conducted by the MVSS, Chandrapur in comppt.No.195 in Tadgaon Range of Bhamragarh Forest Division in the year 1992. The trees of different shapes and girths were selected for the purpose of this study. Results obtained are as below :

YIELD OF MOHA FLOWER AND FRUITS:

Weight in Kg.			
Sr.No.	G.B.H.in Cm	Flower	Seed
1.	076 - 090	08.00	1.20
2.	091 - 105	10.00	1.00
3.	106 - 120	11.25	2.00
4.	136 - 150	13.30	2.75
5.	151 - 175	13.00	3.80
6.	176 - 190	15.00	4.00
7.	206 - 220	20.00	4.30
	Average	12.94	2.72

As per year 1992 was not a good seed year, the average obtained above is on lower side.

8.4.3.6. The rates of royalty in Rs/Qtl. Of Moha fower and seed as decided by the T.D.C. in the year, 95-96, 96-97, 97-98, 98-99, 1999-2000.

RATE OF ROYALTY OF MOHA FLOWER AND FRUIT GIVEN BY TDC.

Sr.No.	Produce	1995-96	96-97	97-98	98-99	1999-2000
1.	Moha Flower	5.00	5.00	5.00	5.00	5.00
2.	Moha seed	5.00	5.00	5.00	5.00	5.00

8.4.3.7. As per the tree enumeration carried out by the SOFR. Unit II of Chandrapur, the number of Moha trees/ha having gbh>45 cm is 7.31. On the basis of the study mentioned above expected yields of flower and seed come to 94.59 kg/ha and 19.74 kg/ha respectively. However, the phenological character of the species is that flowering and fruiting generally occur alternate years or twice in three years.

FORMATION OF UNITS AND COUPES :

8.4.3.8. The range will be the unit of working for the purpose of this working circle. Since operation is to be carried annually throughout the area and so the unit will be the coupe in this case.

AGENCIES FOR COLLECTION :

8.4.3.9. The collection of moha flowers and seeds is presently being done by individuals. Normally they confine themselves around their village only to collect moha flower and seeds. As per latest amendment to Panchayati Raj Act, the ownership of the minor forest produces in schedule areas is of gram panchayat. The collection and disposal of that is to be carried out by the gram panchayat as decided by the concerned gram sabha. Most of the tract is under schedule areas. Hence the collection and disposal of these minor forest produces will be governed by the panchayat concerned. In the non scheduled areas, for large scale operation, collection may be done either by FLCS or other agency under terms and conditions as decided by the Government.

MARKET :

8.4.3.10. Moha flower and seed come under monopoly Act and so the collection of moha flower and seed is done by people and purchased by the TDC.

OTHER REGULATIONS :

8.4.3.11. Compartment wise list of moha trees should be prepared and maintained at beat, round and range levels.

8.4.3.12. As it is a bare fact that one of the important reasons of forest fire is the burning of leaf litter on ground under moha trees by the people to collect moha flower and fruits. Therefore, before the start of flower falling, the ground under the moha tree crown should be cleaned with the cooperation of villagers and chaukidars. This may be treated as one of the most important duties of the Beat Guard, failure in it and occurrence of fire should be viewed very seriously.

8.4.3.13. The measures for enhancing the production and productivity by local means should be explored and taken. Local people may be of great help in this regard.

8.4.4. GUM :

8.4.4.1. USE AND VALUE : Kulu (*Sterculia urens*), Dhawada (*Anogeissus latifolia*) and Salai (*Boswellia serrata*) gums are the main sources of gum production in this tract. These are used in medicines, chemicals, cosmetics and food industries. Salai gum is mostly used as an incense and is said to be used in the Indian medicines for rheumatism and nervous diseases. It has the possibility of becoming an important substitute for imported Canada balsam, used as mounting media in the preparation of microscopic slides. This gum is very similar to turpentine oil. Varnish and paints prepared from it have been found to be suitable. It may also be suitable in the manufacture of elastic adhesive, lacquers, oilcloth compositions, ink and perfumery. Kulu gum is the costliest gum and is having export potential. Dhawada gum is very good for the preparation of many food articles.

8.4.4.2. YIELD : The rangewise distribution of such trees in different girth classes is given in Appendix no XXVI. The study of yield of gums has not been done in this tract. The production is low. No scientific method for tapping has been used so far in this area. This is a very potential field of employment generation and revenue earning. Besides, the regulations of the collection is very important from protection of forest from the fire point of view.

8.4.4.3. TAPPING RULES : The rules for tapping, derived by the FRI, Dehradun, are as follows :

The tapping season will commence from November to end of May each year. No tree below 90 cm in girth will be tapped.

Tapping will be confined to the main bole of trees between 15 cm from ground level to the point from which first branch is given off.

Only trees above 90 cm in girth at breast height will be tapped.

Each tree will be tapped continuously for 3 years and will be given a rest for 3 years thereafter. The second tapping cycle will begin in the 7th year after the commencement of tapping season and will continue for another period of 3 years.

The initial blaze of 20 cm wide and 30 cm in length or height may be made in the month of November on trees at 15 cm above ground level with a sharp edge having 7.5 cm wide blade. The blaze is made 0.6 cm deep in the bark.

Blaze may be made horizontally leaving approximately equal space between the blazes. The blazes should not have any loose fiber. The lower surface of the blaze should be slightly slopping outwards to avoid lodging of guggul in the blazed pocket in case initial blazing is done by edge.

The guggul starts oozing out soon after blazes are made and may be collected initially after a month i.e. by about December when the blazes may also be freshened. Subsequent collections and freshening may be done at fortnightly upto May. Thus 12 freshening may be required to be made during the year.

In each freshening, the lower surface is not to be freshened. The edges may be scraped so that only 3.8 cm is increased on either side in width at the end of 12 freshening. This means that about 0.3 cm should be scraped off either side in width in each freshening.

The lowest row of blazes will be at one meter above the ground level. The next row of blazes will be made at the height of 60 cm from the lower i.e. at a total height of 1.6 metre from the ground level. The vertical portion of the blaze of upper row will alternate with similar portion of the row and no two blazes of the two rows will be directly one above the other.

The number of blazes to be made on each tree will depend on its girth at breast height as given below :

NO OF BLAZES ON EACH TREE

Sr.No	Girth at breast height	Max. No. of blazes to be made on each tree
1.	1.00m to 1.3 m	2
2.	1.3m to 2.0 m	3
3.	2.0m to 3 m	4
4.	Over 3 m	1 blaze for every 45 cm girth in addition to category 3 above

No fresh blaze will be made on the partially healed up surface or old wounds.

Each blaze will be in a shape of parabola with a 2.5 cm wide base. The curved side of the parabola will be upwards and of height not more than 7.50 cm and the depth of the blaze will not exceed 0.6 cm in the wood.

At the end of the session, the height of the blaze shall not be greater than 12.50 cm Maximum permissible dimension of each blaze shall be 10 cm x 12.5 cm x 0.6 cm in width, height and depth respectively.

Since the tapping is to be done continuously for three years the total height of the blaze at the end of three years of tapping will be 37.5 cm, the width and depth remaining the same.

In the second cycle i.e. in the 7th year (after three years rest) new blazes will be made in the same way in the unblazed portion, in between the blazed portions of the first cycle. This blazing will continue for another three years in the manner described above and the operation will be repeated till unblazed portion is fully covered.

8.4.4.4. FORMATION OF UNITS AND COUPES : Range is the unit. Each unit will be divided into three annual coupes details of which will be given in Appendix no.XXVI. The working cycle will be of three years.

8.4.4.5. AGENCY : As per latest amendment to Panchayati Raj Act, the ownership of the minor forest produces in schedule areas is of gram panchayat. The collection and disposal of that is to be carried out by the gram panchayat as decided by the concerned gram sabha Most of the tract is under schedule areas. Hence the collection and disposal of these minor forest

produces will be governed by the panchayat concerned. In the non scheduled areas, for large scale operation, collection may be done either by FLCS or other agency under terms and conditions as decided by the Government.

8.4.4.6. MARKET : There is monopoly purchase by TDC under the provisions of Monopoly Act. Besides, the export of raw or finished goods should also be thought of :

8.4.4.7. OTHER REGULATIONS :

The compartment wise list of such trees should be prepared and maintained at beat, round and range levels.

Cleaning around the trees to facilitate gum collection and to avoid fire, should be done.

To increase the population of salai trees, soil should be dug up in the form of a ring with radius 1.5 times that of crown. By doing so root suckers are injured and from which profuse shoots come out. Singling and tending them will increase the population of this species. The same may be tried for Kulu as well.

Gum producing trees should be reserved from felling.

A strict watch is necessary to enforce tapping rules and check unauthorized collection of gum and tapping during the period of rest.

8.4.5. TENDU :

8.4.5.1. USE : This is one of the most important NTFP of the tract which gives handsome revenue. This is used for manufacture of bidi. Presently people benefit from this NTFP only by way of getting wages for collection of leaves. But by setting cottage industry for bidi manufacture will provide the maximum benefit from tendu to the people. Bidi making is such an activity which can be started without any costly infrastructure. Besides, bidi making can be done at any leisure time.

8.4.5.2. YIELD : The estimated yield of tendu leaves is approximately 46000 standard bags. The details of production and royalty received by the Division will be given appendix XX.

8.4.5.3. No scientific efforts are seen to have been made to augment the tendu leaves production in this tract so far. On the contrary, every year pruning is carried out officially to get good flush of leaves. Besides, this clandestine burning after pruning is got done by the contractors to get good flush off leaves. Both these operation are detrimental to the future production of the leaves. During pruning all small size plants, whether of seed origin seedlings or coppice origin seedlings, are cut every year resulting into a threat to future seed bearers. If such type of operations continue, the seed bearer will go on diminishing season after season. Besides, in the greed of flush of leaves, yearly entire forest is burnt which cause much more damage as compared to the benefits obtained out it. This is undisputed fact that this is the most important reason of forest fire. This practice so for called augmentation of leaves production is required to be stopped forthwith.

8.4.5.4. FORMATION OF UNITS : The tract dealt has been divided into 26 tendu units. Which has been divided into 23 working units/groups.

8.4.5.5. AGENCY:With the enactment of “Maharashtra Minor Forest Produce (Regulation of Trade) Act, 1969” the trade in tendu leaves has been nationalised. Now tendu has been excluded from the list of minor forest produce after due amendment to this Act by the government of Maharashtra. Tendu is covered under the Nationalised Produce and accordingly the collection and disposal of tendu leaves is being done by State Government through Chief Conservator of Forests MS. Under this Act, tendu units are sold by tender. Prior to 1991 the standard bag system was in practice. But after that the lumpsum system has been adopted. In the new system the pronounced illicit cutting of tendu trees was observed. This is because of the fact that the contractors want to have more and more leaves by hook or crook. The system has now been revised.

8.4.5.6. MARKET : Under the present system the units are sold by tender. As per the present proposition under this plan, instead of selling units, units should be auctioned by tender for collection of leaves on commission basis. The final disposal should be done departmentally in open auction or by tender as has been discussed above.

8.4.5.7. OTHER REGULATIONS :

To augment the tendu tree population, soil should be dug up 15 to 20 cm deep around the tree, in a circular ring of diameter equal to that of the crown so as to cause injuries to the root suckers. The

trees of gbh more than 45 cm could be selected for such operation. This will cause injuries to the root suckers to stimulate growth of seedlings through them. The tending and singling of shoots from root suckers will increase the population of the tendu tree.

Pruning should not be done yearly. It should be done at an interval of 3 years, during which some seedlings could establish and become the future seed bearer. Pruning should strictly and exclusively be of branches and not of seedlings irrespective of their origin.

8.4.6. BAMBOO :

8.4.6.1. USE : This is one of the important (non)timber forest produce of this tract. As the bamboo is timber from the definition of timber as per the definition given in Indian Forest Act, it is not treated as minor forest produce and has been excluded from the list of minor forest produces. This is popularly known as poor man's timber. The local people make use of it in a variety of ways. People eat tender rhizomes as vegetable during the monsoon. Besides, it is used by Burads to prepare bamboo articles and local people in construction of huts, houses, cattle sheds and fencing. This is used by outsiders in a number of industries such as Paper and Pulp, Ice cream etc.

8.4.6.2. YIELD : Due to gregarious flowering, the clumps are yet to form and therefore, there is no yield.

8.4.6.3. FORMATION OF COUPES : The details of it are given in bamboo overlapping working circle.

8.4.6.4. AGENCY : This has been discussed in detail in Bamboo Overlapping Working Circle.

8.4.6.5. VILLAGE INDUSTRIES : Marking bamboo tatta is one of the important and potential propositions. This should be encouraged, alongwith the other activities with bamboos by the local people. There is huge demand of the same in this area by many agencies, one of them is WCL. This will increase sharply the economic status of the local people. The raw material will be supplied by the department in the manner described in the Bamboo Overlapping Working Circle.

8.4.6.6. MARKET : The general market for the bamboo has been described in detail in Bamboo Overlapping Working Circle. So far as 'bamboo tatta' is concerned, for its contracts should be made with WCL, by assessing its requirement. The supply to the concern should be made at the rate, terms and conditions as decided by the Government.

8.4.6.7. OTHER REGULATIONS : A list of firms requiring bamboo tatta and its quality should be prepared and maintained at range and division levels.

8.4.7. MYRABOLONS, DIKAMALI AND NIRMALI FRUITS :

8.4.7.1. USE : These NTFP are used in many ways. Hirda, Beheda and Aonla are most common amongst myrabolons. These are of high medicinal value and are used in many Ayurvedic medicines. Hirda and Beheda are given to children in villages invariably for cold, cough and stomach disorder. Dikamali and Nirmali fruits are used in chemicals and other industrial uses.

8.4.7.2. YIELD : So far no study has been conducted to know the yield of fruits for trees of such species. The rangewise distribution of such species in different girth classes will be given in Appendix no XXVI.

8.4.7.3. FORMATION OF UNITS AND COUPES : The range will be the unit. Since working is annual and covers the entire area and so unit will also be the coupe.

8.4.7.4. AGENCY FOR HARVESTING : As per latest amendment to Panchayati Raj Act, the ownership of the minor forest produces in schedule areas is of gram panchayat. The

collection and disposal of that is to be carried out by the gram panchayat as decided by the concerned gram sabha. Most of the tract is under schedule areas. Hence the collection and disposal of these minor forest produces will be governed by the panchayat concerned. In the non scheduled areas, for large scale operation, the units should be given on lease. The lessee will collect the same as per the direction of the Dy. C.F. concerned. The lease period should be from 1st July to 30th June. Lease should be given for one year by calling tender at division or circle level. On failure of tender, Departmental harvesting can be thought of, if it is profitable and market is surveyed and assured.

8.4.7.5. MARKET : Market should be surveyed and recorded so that in case of departmental working the same could be used.

8.4.7.6. OTHER REGULATIONS :

The detailed list of such species should be prepared and maintained at beat, round and range levels. These species should be excluded from felling.

8.4.8. BROOM GRASS :

8.4.8.1.1. USE : This grass is used in preparation of broom which is usually used in houses. It is a seasonal crop and localised one.

8.4.8.2. YIELD : So far no study has been conducted to assess the yield of this grass.

8.4.8.3. FORMATION OF UNIT : The range will be the unit.

8.4.8.4. AGENCY : As per latest amendment to Panchayati Raj Act, the ownership of the minor forest produces in schedule areas is of gram panchayat. The collection and disposal of that is to be carried out by the gram panchayat as decided by the concerned gram sabha. Most of the tract is under schedule areas. Hence the collection and disposal of these minor forest produces will be governed by the panchayat concerned. In the non scheduled areas, for large scale operation, the unit will be sold by calling tender.

8.4.8.5. OTHER REGULATIONS :

The areas suitable for this grass should be sown.

The compartments wise details should be prepared and maintained at beat, round and range levels.

The area should be fire protected.

8.4.9. SABAI GRASS (*Eulaliopsis binata*)

8.4.9.1.1. USE : This is very good soil binder and comes up well in Wasteland as well. This is good for soil as well as quick-yielding cash crop. This is used in making ropes.

8.4.9.2. PLANTING PATTERN : This is planted at a close spacing of 45 cm x 45 cm in the intervening space in plantation. In the areas selected for plantation by people's participation, this can be introduced on experimental basis.

8.4.9.3. YIELD AND RETURN : Sabai grass is not available in this tract and so study for yield and return has not been made. However, a successful study has been conducted in Kendbona village in West Bengal, the results of which published in Vol. 118 of Indian Forester, for the month of December, 1992, is reproduced as follows : "The sabai, planted in 1989, in 17 ha areas was cut back, more by way of a tending operation than regular harvest, to induce better growth, in 1990. The total beneficiaries were 48 families. Each beneficiary received as share of Rs. 135/- . In 1991, each received a share of Rs. 1000/- during the month of September, which is the leanest month of the year for the village people. The yield of sabai continues to increase reaching its peak around the 7th year after planting, and the area has to be replanted on the 8th or 9th year. Sabai when made into ropes, fetched a price of Rs. 6/- per Kg as against Rs. 2/- per Kg for the grass. Hand operated rope making machine, that can be operated by a team of two, has been designed and fabricated in West Bengal."

8.4.9.4. FORMATION OF UNIT AND COUPE : The range will be the unit and coupe will overlap with coupes in which plantation is to be taken in any Working Circle.

8.4.9.5. AGENCY : The Forest Protection Committee will be formed under the umbrella of G.R. No. SLF-109/C.N.119/F-II, Mantralaya, Bombay dated 16th March, 1992 in view of people's participation in forest management. The same will be motivated to take the scheme. If the people fail to come forward, on an experimental basis department should take such plantation on an appropriate size in suitable area. The above committee should be involved right from the time of formulation of the scheme. Frequent discussions are also required to be held with them regarding the management of the assets so created. Ladies should also be encouraged to take part in it.

8.4.9.6. MARKET : Market for sabai rope can easily be available. All the nearby cities will serve the role of the market. Besides, this will be used in large scale for bundling of bamboos in bamboo working coupes of this tract and nearby divisions.

8.4.9.7. OTHER REGULATIONS :

The market survey with respect to price and demand of the sabai rope should be made and record should be maintained at range and division levels.

The training for making ropes to a few selected villagers, on an experimental basis, should be imparted.

Z.P. should be involved for solving financial bottleneck.

8.4.10. KHAIR :

8.4.10.1. The khair tree is distributed more or less in all ranges of the division. Due to its prominent occurrence a separate Khair Working Circle was formed in the previous plan. But harvesting could not be done possibly due to lack of demand. Presently, this is not being properly used. As this is very valuable species, its proper use is essential to increase the productivity of the area hence taking it under the purview of scientific management is must. Keeping in view the past bottleneck in management, practical proposition has been made hereunder.

8.4.10.2. PROPERTIES : Khair is known to occur on granite, gneiss, schist, quartzite, basalt, trap, limestone, conglomerate and laterite. It grows best on porous alluvium composed of sand and shingle. It also occurs on black cotton soil. Khair is strong light-demander. It is capable of growing in dry situations where almost every other species fail to survive. The tree coppice well upto moderate size and produces root suckers, particularly where the roots have been exposed. This character can be used for its propagation as has been suggested for Tendu. Coppice shoots, however, require complete light for their development. Root and shoot cuttings are also possible mode of propagation.

8.4.10.3. The wood is very hard and heavy. The average weight at 12% moisture is about 1010 kg/m³ (ranging from 880 to 1170). The density of khair is 0.875. Growth rings are formed and are fairly distinct, demarcated by a fine, interrupted line of parenchyma occasionally accompanied by somewhat larger vessels. The timber is very hard and strong, very steady and moderately tough. The sap wood is not durable. The heartwood is very durable and is described by Pearson "one of the most durable Indian Woods which is seldom, if ever, attacked by white ants and fungi"

8.4.10.4. USE OF KHAIR : The khair heartwood is chiefly used for the production of katha and cutch since very long time. It is valuable structural timber due to its natural durability of heartwood. This species has been classified as "Super group" timber suitable for large span more than 12 m and is placed as the first choice of selection for management structure (ISI : 1962). It is eminently suitable for tools and tool handles, specially for mallets and plane bodies. It is used for all kinds of agricultural implements and is excellent for making spokes and hubs of cart wheels. It is used for posts in house construction and for making rice pastels, oil expellers, gun butt etc. The spent heartwood is also used as fuel in the Katha-boiler and Katha bhatties. The charcoal of dead khair wood is much valued and used by goldsmiths. The calorie values of moisture free sapwood and heartwood are 5142 and 4946 calories respectively. The exhausted Khair heartwood shavings can economically be utilized for

making partition boards and decorative boards and also can be used as top of table for drawing room.

8.4.10.5. The results of experiments in FRI on sapwood and spent heartwood of khair showed the profitable utilization of the same for producing bleached cellulose, which will find use in multifarious cellulose base industries, like carboxy ethyl cellulose, cellulose acetate and even for paper and paper boards if made available in large quantities.

8.4.10.6. Khair gum is considered to be very good and it is a good substitute for gum arabic. It is advisable that the khair trees should be tapped for some years to obtain gum prior to felling for katha production.

8.4.10.7. The bark has a stringent taste and it is useful in the treatment of snake bites and the paste of the bark is also useful in conjunctivitis. The juice of the fresh bark is given with asafoetida in haemoptysis (spitting of blood).

8.4.10.8. YIELD : The khair is the species mainly of degraded miscellaneous forests. The no. of stems/ha (khair) and its distribution among different girth classes will be given in Appendix XXVI. The yield of khair has not been estimated separately.

8.4.10.9. KATHA AND CUTCH : Khair heartwood yields an stringent extract composed chemically of two constituents :

KATHA (CATECHIN) : A crystalline substance, of pale brown colour, soluble in hot water, but insoluble in cold water, sweetish in taste.

CUTCH (CATECHU TANNIE ACID) : A non crystalline substance, of dark brown colour and soluble in cold hot water, contains insoluble and some of gummy matters. Katha samples produced by different methods contain catechin content 30 to 70 % and water soluble substance 5 to 7%. Generally the extract (mother liquor) of heartwood is found to contain:

Catechu tannie acid (cutch)	8 - 10 %
Catechin (Katha)	2 - 6 %
Mucilage	6 - 8 %
Residual matters	5 - 7 %

8.4.10.10. USES OF KATHA : Katha is used in pan (Betal) for chewing purposes. It is a principal ingredient in the preparation of pan. Besides, it has many medicinal uses in Ayurvedic and Unani systems of medicine; cooling, digestive; useful in relaxed condition of throat, mouth gums, and also in cough and diarrhoea. Externally, it is used as an stringent and as a cooling application to ulcer boils and eruption of the skins.

8.4.10.11. USES OF CUTCH : It is extensively used as a tanning material, for dyeing purposes and as a preservative for fishing net to import them long life. It is also used for treating ropes and fabrics, which are liable to come in contact with sea and other water, such as sailing ropes, sails , tents, canvas, mail bags etc. It is also used mostly as mordant in dyeing leather and as a retaining material. It is also used in the manufacture of stencil and printers ink, in oil for well drilling operations for reducing the viscosity of drilling mud (ONGC).

8.4.10.12. METHODS OF EXTRACTION OF KATHA : The prevalent methods for extraction of katha & cutch from khair wood are by the factories and small scale manufacturers in the forests. To set up a factory is a problem but a small scale, the manufacture by indigenous method can be thought of for this area. For setting up such small scale manufacturing units can be got done using 10% forest grant. This will solve the financial bottleneck.

8.4.10.13. DESCRIPTIONS OF INDIGENOUS METHOD OF KATHA

MANUFACTURING : The indigenous process which is commonly known as “Handi” method for the manufacture of edible katha is being followed in India since centuries. In this process generally earthen vessels are used to various operations, viz extraction, evaporation, crystallization etc. This method was having a number of defects which were removed by

improved indigenous method devised by FRI, Dehradun. Outlines of the improved method of katha and cutch manufacturing are as follows :

PREPARATION OF CHIPS : The khair logs, after being removed of their bark and sap wood are converted into thin chips by trained labourers by means of hand axes.

EXTRACTION OF CHIPS : The hardwood chips are boiled in the extractors of aluminium keeping the chips in the cages (basket) made of aluminium wire in order to avoid direct contact of the chips with heat. Each cage takes a charge of about 12 Kg of chips and are extracted with about 36 litres of water for about 2 hours in first stage at boiling temperature (chips and water should be in the ratio 1:3). The extraction is repeated second time with fresh water giving a boil for about 2 hours. A third extract may also be taken if necessary in the same conditions. This third extract (mother liquid) of the same chips is used for extracting a fresh batch of the chips.

CONCENTRATION OF MOTHER LIQUOR : These extracts are filtered through marking cloth and are collectively concentrated in open aluminium cauldrons (Karahis) by boiling with steam or with direct heat (Bhatties) to the requisite density of 1.08 to 1.113 depending upon the quality of heartwood and the weather conditions. Each charge is completed (concentrated within about 3 hours.).

CRYSTALLIZATION : After completion of concentration to the requisite density, the concentrated mother liquor is transferred in the aluminium crystallizer and allowed to stand aside in shade for slow crystallization of katha for about 2-3 days or more as the case may be depending upon the season. Seeding of cooled and concentrated liquid (mother liquor) with some crystals of good quality katha always accelerate the crystallization and separation of katha from the crystallized solution. The crystals of katha separate out on the bottom and the thick mass of crystallized katha is separated from the mother liquor, which may gain be seeded, if necessary, for a second crop of katha

FILTRATION : The crystals of katha thus separated into a thick mass (like thick curd) are diluted with requisite amount of cold water and pumped through a hand operated filter press fitted with canvas cloth to separate the katha from the mother liquor. A couple of washings with fresh cold water may be necessary to obtain fairly good quality of katha. Now the filtered mass katha is scraped off the canvas and put again under a hand screw press (book binder type). The last traces of tan liquor are thus drained out.

TABLETING PROCESS : The katha plate of about 2 cm thick is taken out from the wooden frame and cutter, made of copper or aluminium wire, with wooden plate. These tablets are allowed to dry under shade, as open sun drying is injurious to the catechin which gets decomposed and blackened.

The whole processing of one batch is completed within about a week's time, giving a product (Katha) of good quality.

8.4.10.14.CUTCH : The mother liquor (cutch solution) obtained from separation of katha is further concentrated to a suitable consistency (when it gives a thread while hot, lifting by means of a stick) so as to give a solid product of cutch on being poured into wooden frames or cakes of suitable sizes. The cutch naturally takes longer time to dry. It should also be dried in shade.

8.4.10.15. No heavy capital layout is involved and the industry can satisfactorily be run by educated man on a cottage scale.

8.4.10.16.ADDRESS FOR EQUIPMENT PROCUREMENT :

Filter press and other equipment :

M/s. Batli Boi and Company
Post Box No. 190A, Forbes,
Street Fort, Bombay -1.

Chipping machines :

M/s. Singhanian Engineering Works,
84/25, Factory Area,
Kanpur - 12.

Pulveriser and Baby Boiler :

M/s. Rank and Company,
A95/3 Wazirpur Industrial Area,
Delhi - 110 052

Available addresses have been written. There may be other places also in Maharashtra from where, such equipments can be made available. This is for guidance to start preliminary survey etc. After starting the production of Katha, thought should be given for improving quality. By changing the process of manufacturing, the quality of Katha can be improved.

8.4.10.17. FORMATION OF UNITS : The range will be the unit.

8.4.10.18. AGENCY : The harvesting of khair will not be done separately. With the main felling as per the prescriptions in the working plan, khair will be harvested. The harvesting will be done either through FLCS or through department.

8.4.10.19. MARKET : TDC should explore the market. TDC should receive the produce at the rate fixed by the Government of the officer authorized by the Government.

8.4.10.20. OTHER REGULATIONS :

To increase the population of khair trees in suitable sites, circular ring around the tree of radius 1.5 times the crown radius should be made. The depth of the ring should be such that roots are exposed so that shoots come out from root suckers. Singling and tending of such shoots will increase the stocking of this species without spending much.

The record of production of khair should be maintained at Beat, Round, Range and Division levels. The record of supply of khair wood to the small scale industry should be maintained at Range and Division levels. The Conservator of Forests will decide the form in which records are to be maintained.

Gum tapping should be started in the coupe which will be due for felling after 5 years.

For gum tapping only mature trees should be used.

In this working circle, subject has been written in short. The objective is to draw the attention towards this and to translate into reality. By doing this the importance of NTFP will increase and eventually they will be managed in better way and the economic status of the local people will be elevated.

SECTION: 8.5: RESEARCH WORKS :

8.5.1.1. There are so many Non Timber Forest Produce in the forest which are unidentified and untapped. The efforts of the department should be to explore them and manage them scientifically. The identification of medicinal plants is the field to be taken for study immediately. This has wide scope in future. Dr. M.N. Padhye of Nagpur and his team have been conducting a survey of medicinal plants in the forests of Gadchiroli and Chandrapur Districts. Over 150 such plants have been identified so far. The list of plants will be given in Appendix no XLXI. This is not the exhaustive list of medicinal plants. It is open to add more names of such plants. Besides, quantification and localization of the same are the fields for future study. Innovation and research works should always be carried out and the same be recorded and reported properly so that those could be of use to those who come next.

SECTION: 8.6 : OTHER IMPORTANT PRINCIPLES AND PROCEDURES :

8.6.1.1. The following are important principles and procedures:

The annual estimates for collection of Non Timber Forest Produce shall be based upon the experience.

The annual estimates for collection of NTFP shall be approved by the Conservator of Forests.

The Range Forest Officer for the respective range shall issue the passes for collection of NTFP to the lessees and keep record of the collection etc.

The Non Timber Forest Produce lease units should have distinct boundaries.

NTFP collection estimates shall be based upon the inventories of forest resources.

Scheme shall be formulated for improving yield of Non Timber Forest Produce e.g. plantations, protection against disease etc.

Measures shall be taken to maintain and improve the present output of the Non Timber Forest Produce.

CHAPTER – IX

WORKING PLAN FOR WILDLIFE (OVERLAPPING) WORKING CIRCLE

SECTION: 9.1: GENERAL CONSTITUTION OF THE WORKING CIRCLE :

9.1.1.1. This is an overlapping working circle and covers the entire area of the tract. The total area included in this working circle is 1,14,309.4 hectares. The nature of crop covered under the working circle has already been discussed in chapter-II related to forests.

Range	Range area in ha
Ballarshah	16,038.990
Dhaba	5,976.138
Kothari	13,185.420
Rajura	10353.110
Wansadi	48,794.660
Wirur	19,961.080
Total	1,14,309.4

SECTION: 9.2: GENERAL CONDITION OF FAUNA AND FLORA :

9.2.1.1. The tract dealt with has been the natural habitat of a variety of wild animals. The numerical strength present has reduced to the alarming extent mainly due to excess biotic interference. The description of fauna has been given in Chapters V and VIII in Part I of this plan. The flora description of the tract has been given in Chapter II of Part I.

SECTION : 9.3: SPECIAL OBJECTS OF MANAGEMENT :

9.3.1.1. The priority of National Forest Policy is ecological balance and therefore, management of forests is to be done for the same. Since wild animals are the part of the eco-system and therefore, their management is essential. So far management has economic considerations and so wild animals were ignored and they were managed for entertainment. On recognising the fact that wild animals are essential for the survival of living being as becoming an important part of eco-system, the orientation of management of wildlife is changing very fast. Due to some limitations, the intensive management practices are confined to Protected areas only. However, time has come to realize the fact and to manage it in a rational way is essential in areas other than protected areas as well.

9.3.1.2. The conservation and protection measures are required to be taken through out the forest areas. Keeping this aspect into view, the special objects of management decided are as follows :

- (i) To preserve and develop the existing wild animals in this tract.
- (ii) To develop infra structure for existence and development of wild animals, such as water holes, anicuts, salt lick etc.
- (iii) To educate and motivate people for protection and conservation of wild animals and thereby providing an environment of security to the wild animals.

SECTION: 9.4: METHODS OF TREATMENT :

9.4.1.1. No regular schemes are being prescribed for the management of wild animals in this tract. However, following prescriptions are being given for the protection of wild animals, creation of environment of security to them, increasing infrastructure for wildlife management and trying to restore the status of wild animals in this tract:

- (i) People should be made to realize the reasons of depletion of wild animals to such an extent in this tract and the way to restore the status through repeated dialogue with them.
- (ii) Teaching and motivating them for conservation. This principle should be taught to them through stories like the teaching in Panchatantra to bring attitudinal change. This will be

more effective because they are not educated to read and understand any literature. How the wrong doing of them is affecting and likely to affect adversely to their life and life style is to be stressed and they should be convinced.

(iii) Besides, by persuading, teaching and motivating people should be made aware of the Acts and their coverage for the protection of the wild animals. Gram Panchayat will give the name of offender who will be prosecuted under the provision of the Acts. People will be made aware of the penalties for which offenders can be liable.

(i) The villagers as well as our people should keep a vigilant watch over poacher. As soon as any incidence of poaching in this tract is noticed all possible measures should be taken to completely close the door for poachers. Poachers from outside will not dare to enter in this area if the protection is done jointly by villagers and our staff.

(ii) Strict checking at the checking gates erected to check or prevent illicit transport of forest produce.

(iii) The provisions of rewards to the informed or informer in respect of unlicensed or without permit shooting are required to be followed and payment of reward should be made promptly. Besides, giving two advance increment to the staff as a reward is also being proposed.

(iv) For development of basic amenities for wild animals the following works will be carried out:

(a) While preparing the treatment map of a coupe for felling in any of the working circles potential habitat of wild animals and existing waterholes will also be identified and will be shown on the treatment map.

(b) Marking of dead trees in any felling coupe will be done only if their number is more than 2 / ha. These trees will be required to provide snag and den trees for nesting and resting of the wild animals. Trees of commercially low utility be used for this purpose.

(c) During harvesting, some unsound and hollow logs of commercially low utility, not exceeding 3 per ha will be left in the forest to serve as shelter for wild animals.

(d) In the plantations, few fruit trees will also be planted provide food to some wild animals. The choice of species will be the discretion of the Dy. Conservator of Forests.

(e) The waterholes which are frequently visited by wild animals will be excluded from grazing by making a special mention of such areas in the grazing permit licence.

(f) The existing waterholes will remain maintained and at possible sites new waterholes will be created to make the waterholes distributed evenly through out the tract so far as possible.

(g) Suitable locations will be identified where forest tank will be constructed to provide water to the wild animals.

(h) Hoardings on the importance of wild animals and its protection will be exhibited at strategic locations.

(i) The labour camps and transit depots will be established away from the areas having high density of wild animals.

(j) At the selected important places blocks of salt lick will be kept.

9.4.1.2. These prescriptions shall be explained to the field staff and shall be followed while doing the regular working in respective working circle.

SECTION: 9.5: CREATION OF WATER HOLES

9.5.1.1 Water:- The typical geomorphological character of the area restricts the availability of surface water especially during summer. However by using improvised methods, the availability can be enhanced even in summers. The water is available in plenty till January end. During summer, the water is extremely scarce and is available at various places. The following steps will be, taken to improve water supply to animals.

9.5.1.2 Treatment of waterholes:- The storage capacity of waterholes should be improved by deepening it. This should be done by desilting or blasting. Cleaning of selected waterhole should also be carried out occasionally.

9.5.1.3 Jhiria opening:- Oftenly in the sand river beds, there is an under current of water. This can be successfully harnessed by digging a pit around one meter in bed. This should be done at places where the water table is high.

9.5.1.4 Improvised used of hume pipe:- Where the water flow beneath the river is deep, much beyond the reach of wild animals, an improvised method of collecting water by using hume pipe should be under taken. This work should be taken during second week of February. A hume pipe of one meter is held vertically on the sandy bed and sand is removed from between, the pipe sinks gradually under its own weight and it strikes the water within, a depth of 2 to 3 meter. A saucer of 2 meter diameter should be constructed around it. During the month of summer, a fire watcher or a chaukidar should be assigned with the job of pulling few bucket of water and filling the saucer. The hume pipe should be covered with a bamboo mat or a tin plate.

9.5.1.5 Reservoirs and small ponds:- An anicut should be built across a drainage to store the water or alternatively water should be diverted to a small basin by constructing a diversion canal. At least one masonry anicut should be taken once in a year. At other places, the earth filled anicut should be constructed.

9.5.1.6 Tapping of seeps:- Oftenly a small seep of water comes out continuously at places. These water holes can not be utilized by wild animals, but can be made available by some improvised technique. By making chanel or by using P. V. C. pipe of one inch diameter, this water should be drained to a small saucer and from there to another saucer, 50 meters away, with the help of a P.V.C. pipe.

9.5.1.7 Cover improvement:- Development of cover is an important ingradient of the wildlife management. In absence of cover, its sparseness or its poor distribution can limit the use of an area by the wildlife. The work of cover improvement will be taken. Snag, den and caves shall be maintained. The felling of trees which foliate in summer has been prohibited. The technique of managing snag has been prescribed in the separate section.

SECTION: 9.6: GENERAL MEASURES FOR PROTECTION :

9.6.1.1. Area will be strictly and effectively fire protected.

9.6.1.2. Constant vigilance will be kept on the waterholes during summer where animals expose themselves as easy prey due to shortage of water. Every person residing in or within 10 km of these forests and possessing a fire-arm shall register his name with the Deputy Conservator of Forests.

CHAPTER - X

WORKING PLAN FOR FODDER WORKING CIRCLE

SECTION : 10.1 : GENERAL CONSTITUTION :

10.1.1.1 The areas included in this circle are conveniently located adjoining to the villages and can meet the local demands for fodder to a large extent. These area are mostly denuded and understocked due to heavy grazing. The compactness of soil has resulted in a complete failure of regeneration of the timber species. It is intended to develop these areas as fodder resources, consisting both of grasses legumes. These pasture land are intended to develop on rotational basis. The stall feeding will be encouraged.

The extent of the area allotted to this working circle is **20544.14** ha.

ALLOTMENT OF AREA

Sr. No	Range	Area of the Range	Area Allotted W.C.	% wrt Range Area	% wrt W.C. Area
1	Rajura	10353.112	168.22	1.62%	0.82%
2	Wirur	19961.079	1937.129	9.70%	9.43%
3	Wansadi	48794.662	9085.826	18.62%	44.22%
4	Dhaba	5976.138	173.4	2.90%	0.84%
5	Kothari	13185.422	4270.882	32.39%	20.79%
6	Ballarshah	16038.986	4908.683	30.60%	23.90%
	Total:-	114309.399	20544.14	17.97% w.r.t.dn.	100%

SECTION : 2: GENERAL CHARACTERS OF THE VEGETATION :

10.2.1.1. The areas included in this circle belong to site quality IV 'b' and are mostly devoid of any appreciable tree growth or are sparsely wooded with species like Hiwar, Palas, Teak, Bor, Khair etc. Majority of the areas generally have grasses of less fodder value like Kusal (Andropogon contortus) and Bhurbhshi (Eragrostis tennela). Good fodder grasses like Sheda, Pauniya and Marvel etc. are sparsely met with. The details of the vegetation are given under local subtype 'Degraded Scrub Forests' of chapter II 'The Forest'.

SECTION : 10.3 : SPECIAL OBJECTS OF MANAGEMENT :

i) To improve the quality and quantity of fodder in the forest by introducing the better varieties of fodder grasses.

ii) To meet the local demand for fodder and thereby to reduce heavy grazing pressure on the forests.

SECTION : 10.4 : COMPARTMENT AND WORKING SERIES :

10.4.1.1 120 Full, 24 Part Compartments with area **20544.14** ha. are kept for rotational grazing. The details are given in Appendix No. XXVI of Volume -II

SECTION : 10.5 : ANALYSIS AND VALUATION OF THE CROP :

Stock-mapping -

10.5.1.1. These areas have been stocked mapped using satellite imageries. The areas having grey values between 41 to 70 in NDVI has been choosen for allotted to this working circle.

Age and density :- The area is mostly under stocked and barren.

Silvicultural System:- Silvipastoral system has been applied for is management.

Felling Series:- Eleven felling series has been prescribed.

Development of fodder resources in the closed area:- The following treatment has been prescribed for the development fodder resources.

About 10 ha. of the coupe area will be selected for grass development. This area will be lightly ploughed and soil pulverised. Seeds sowing of grasses will be done on this area. The weeds shall be removed.

Ploughing and broadcast sowing, uprooting of weeds.

Sowing procedure - It may be done in two ways.

by Broad casting

by sowing in line

10.5.1.2.In case the soil is deep, clayey in nature and sloppy either, the grass should be raised by broadcasting. In case it is decided to sow grass and legume by lines, it should be kept 10 Cm. away in line and when grass and legume is sown together, it should be kept 30 cm. away. Between the two rows of grasses the legume is sown. In case of broad casting, the seed is spread over the bed and then spread with the leaf branch. This allows a small cover of soil over these seeds. In case of line sowing, seeds should be sown 0.4 to 0.8 cm. below soil, while the legume is sown 0.8 to 1.2 cm below soil. The heavy seeds are sown 3 to 4 mm in depth. Sowing by forming pillets is more advantageous. Seeds of grass / legume are made upto pillets of size 0.5 to 1.0 cm. The material mixed is seed, gober, black cotton soil and sand in a ratio 1:1:3:1 with adequate water.

Quantity of seeds in each bed:

Type	Spes	Quantity per bed.
Lighter seeds	Cenchrus Ciliaris, Dicanthium annulatum, Panicum maximum, Stylo hemata.	6-10 gm/bed
Middle sized seeds	Elyosia scroloides, Macropitium altropurpureum, Deshmonthes virgates, Despondium spes.	15-20 gm/bed
Big sized seeds	Dolichos lablab, Clitoria ternates, Lablab purpureus.	20-30 gm/bed

Time of sowing :- July.

10.5.1.3 Pretreatment of seeds : Legume seeds need pretreatment due to its hard coat and it is essential to soften it before sowing. The pretreatment is by putting in hot water. Stylo seeds are kept inside the boiling water for 60 to 90 seconds and then sown, when the germination percentage achieved is 60 to 100. Grass seeds usually have the viability of 9 to 24 month and it is found to germinate very well, when it is sown after soaking in water for 6 to 8 hours. The seeds of legume should be sown with rhizobium culture, which is good for growth legume seeds before sowing and after pretreatment is kept in a pot, with a mixture of Juggary, so that the seeds just get submerged. The rhizobium is then added and every thing is then mixed thoroughly and dried in sunshed and not in sun as it may kill rhizobium.

10.5.1.4.Sowing of mixed seed:- Very oftenly there is a less rain, the way there are season of high rain. In such cases, the mixed seed, of grasses are sown like the mixture of Cenchrus citijeris), Dicanthium annulatum, Cenchrus culeorides, when rain fall is less gets established and when rainfall is high Dicanthium annulatum is established. In the medium rains all grass get established. Seeds will be spread on the nala banks, where the moisture regime is good and the grass easily gets established. Grasses are poor in protein but high in yield. The legumes are rich in protein but poor in production.

10.5.1.5.Choice of grasses: The choice of species in grass will in favour of those, which are nutritive grasses giving high yields in low rainfall areas. Such species are:

MARVEL - 7 (Dichanthium annulatum)

It is a perennial grass and it contains 7% of protein. The yield per ha. is about 26 quintals.

SHEDA (*Ischaemum laxum*)

It is perennial grass and it contains 6 to 7% of protein. The yield per ha. is about 18 quintals.

PAVNIA (*Schima nervosum*)

It is perennial grass and it contains 5% of protein. The yield per ha. could be about 31 quintals in favourable conditions.

10.5.1.6. At present reseeding with *Schima nervosum* and *Dicanthum annulatum* is being carried out all over Kurans irrespective of soil conditions. *S. nervosum* is the natural climax on the hill slopes, red murromy and well drained soils, *Chrysopogon fulvus* provide higher yield on red and medium soils and *D. annulatum* performs better from medium to heavy soil. In order to achieve better success it is necessary that the choice of Grass species should be according to the soil type met within a Kuran.

10.5.1.7. The light ploughing should be restored to, for obtaining better germination and optimum grass production, light ploughing and seeding at a rate of four to six kg/ha after pelleting the seeds with silt or clay mixed with cow dung and sand (1:3:1:1 ratio) in lines 50 cm apart need to be resorted to. The most important point to be borne in mind is the depth of sowing of seeds, which under no circumstances should be deeper than 0.8 cm in the case of grass and 1.2 cm in the case of legumes. While planting, a width of 4 meters shall be sown with the grass followed by a two meter width of stylo species, again a four meter width of grass, followed by a meter width of subabbual and so on. This will increase fodder production.

The list of grass/legume with their local name is given below.

The grazing should be permitted only after the seeds have fallen.

Local Name		Status
vtu ?kkl	<i>Cenchrus ciliaris</i>	Grass
dsyk ?kkl	<i>Dicanthum annulatum</i>	Grass
fxuh	<i>Panicum maxicum</i>	Grass
LVkbZyks	<i>Stylo hemata</i>	Legume
oudqYFkh	<i>Etylosia screvoides</i>	Legume
fjktks	<i>Macroptilium atropurpureum</i>	Legume
;FkjFk?kkl	<i>Deshmanthes virgates</i>	Legume
fMleksfM;e	<i>Desmodium</i>	Legume
QhYVq ohu	<i>Lablab purpureus</i>	Legume
/koy	<i>Chrysopogon fulrus</i>	Grass
lsou	<i>Conchris culeories</i>	Grass
/kku ?kkl	<i>Cenchrus citejeris</i>	Grass
uUnh ?kkl	<i>Citeria specileta</i>	Grass
lsu ?kkl	<i>Schima nurvosum</i>	Grass
nhuk ukFk	<i>Pennisetum pedicillatum</i>	Grass
yEik@Lihij ¹ / ₂ ?kkl	<i>Heteropogon controtres</i>	Grass

SECTION : 10.6 : METHOD OF TREATMENT :**10.6. FOR ROTATIONAL GRAZING :**

10.6.1.1. One coupe from each fodder series will be taken up each year for special improvement operations & will remain closed to grazing for a period of 2 years. A statement showing sequence of coupes which will be taken up for special improvement works & will remain closed to grazing for a period of 2 years, is given in appendix No. XXVIII (h). Thus in the first year coupe 'A' will remain closed to grazing while coupe B to F will remain open for grazing. In the second year coupes A & B will remain closed to grazing & coupes C to F will remain open to grazing. In the

third year coupe A & Coupes D to F will remain open to grazing while coupes B & C will be closed to grazing. In the fourth year coupes A, B, E & F will remain open to grazing while coupes C & D will remain closed to grazing. In this way after every six years the cycle will be repeated.

10.6.1.2. In the 1st year of operation Treatment Map shall be prepared for the closed coupe to be treated and following works shall be taken up.

i) The area needs extensive soil and moisture Conservation measures. Therefore nala bunding and gully plugging LCTs & WATs shall be undertaken.

ii) All obnoxious weeds and thorny shrubs and bushes will be uprooted., The unpalatable grasses such as kusal, Bhurbhusi etc. will also be eradicated in the pre - flowering stage only.

iii) The fodder/legume shall be developed as described above.

iv) The fodder grasses raised will not be permitted to cut during the first three years of their introduction so as to allow them to seed and multiply.

v) All existing trees will be retained except the dead trees.

vi) The coupe under treatment will be effectively fire-traced every year. It will be closed to grazing for two consecutive year after treatment. Controlled grazing will only be allowed after October 31st to 31st May in the 4th year onwards.

SECTION : 10.7 : FORMATION OF COUPES FOR ROTATIONAL GRAZING :

The details are given in the appendix no.XXVIII(h).

SECTION : 10.8: IMPLEMENTING AGENCY :

All the prescriptions will be carried out by the department itself.

SECTION : 10.9: SOIL AND MOISTURE CONSERVATION WORKS :

Gully Plugging & nala bunding LCTs & WATs shall be done as per the requirement of the site.

SECTION : 10.10 : REGENERATION :

10.10.1.1 NR of teak and other miscellaneous tree species will be taken care of as prescribed under section 5 of chapter on 'SCI Working Circle.'

SECTION : 10.11 : OTHER REGULATIONS:

10.11.1.1 Main working coupes will be fire traced every year and will remain completely closed to grazing as mentioned above .

10.11.1.2. JFM:- These area after development of fodder resources shall be handed over to JFM committees for the effective management and protection. The JFM committee may collect the fees in lieu of grazing by the cattle, subjected to the cattle unit permitted, as per grazing settlement.

CHAPTER-XI

WORKING PLAN FOR OTHER IMPORTANT REGULATIONS

SECTION : 11.1: DEMARCATION OF COUPE AND PREPARATION OF TREATMENT MAP.

11.1.1.1. The coupe will be demarcated one year in advance of working as mentioned under different working circles and a treatment map will be prepared by the R.F.O., which will be verified by an A.C.F. After that a coupe demarcation certificate alongwith the treatment map will be furnished by the concerned R.F.O. in the following format :

I, -----, R.F.O.-----
 ----- certify that I have personally inspected the demarcation of coupe No. ----
 -----in Compartment No.-----of -----F.S. in ----
 ----- W.C. on dated
 ----- and have prepared the treatment map as per the
 prescriptions of the working plan. The area of the coupe is----- ha

(-----)
 RANGE FOREST OFFICER, -----
 Signature of the RFO with date.

Counter Signed by

(-----)
 Assistant Conservator of Forests,

Counter signature of ACF with date

11.1.1.2.DEMARCATION OF COUPE :

(i) Annual coupe will be demarcated by cutting and clearing bushy undergrowth on 3 m wide line and by erecting pillars or posts in the middle of the line at suitable intervals, except where the coupe boundary runs along a big nala, a fire line or a road. Coupe number and felling series will be written on the pillars on the side away from the area of the coupe.

(ii) Selected trees at suitable intervals, standing on the periphery of the coupe, will be given two coaltar bands and a geru or red band in between. The lower coaltar band will be at B.H. and the other coaltar band will be 15 cm above it. Just below the lower coaltar band serial number in arabic will be given on the side away from the area of the coupe. The serial numbers of such trees will be maintained in the marking register in the following format :-

Serial Number.	Species	GBH(OB) in Centimetr	Remarks
1	2	3	4

(iii) No trees bearing coupe demarcation bands will be marked for felling.

11.1.1.3.DEMARCATION OF SECTIONS :

(i) To control harvesting, each coupe marked for felling will normally be divided into four approximately equal sections. Sections will be demarcated by 1.5 m wide cut lines by clearing brushwood unless the section line runs along a permanent feature, e.g. nala.

(ii) Trees above 45 cm girth, selected at suitable intervals on the inner edge of the 1.5 m wide cleared section line will be given two coaltar bands 15 cm apart, the lower coaltar band

being at breast height. Just below the lower coaltar band section number will be given on the side away from the area they would denote.

11.1.1.4. DEMARCATION OF PROTECTION AREAS : Selected trees, on the periphery of the protection areas will be given two geru bands 15 cm apart, lower band being at b.h. In addition, a cross in geru colour between the bands will also be given on the side away from the protection areas. All those trees will be serially numbered. The serial number will be given just below the lower geru band, on the side bearing the cross. All the protection areas will be numbered in Roman numerals and the trees standing on the periphery of each protection area will be numbered in Arabic, adopting separate series for each area, so that the trees on the periphery of protection area No.1 will bear the Sr.No. I/1 and the similar trees on the priority of protection area No.II will bear the No.II/1 etc. The serially numbered trees will be recorded in the following format :-

Serial Number.	Species	GBH(OB) in Centimetr	Remarks
1	2	3	4

11.1.1.4. DEMARCATION OF OTHER AREAS GIVEN IN THE TREATMENT MAP :The other categories of areas will be demarcated by giving one geru band and one coaltar band. The geru band will be at b.h. and the coaltar band above this and at a height of 5 cm above this.

11.1.1.5. METOD/TECHNIQUE OF MARKING OF TREES :

(i) All trees to be marked for felling will be given a geru band at b.h. after removing the bark and will bear marking hammer marks at both b.h. and base on a clear blaze of size - (10 cm x 10 cm).

(ii) Following trees in addition will bear digit serial nos. at both b.h. and base :

All trees of teak, bija, shisham, ain, tiwas, haldu, kalam, dhawada and shiwan of 45 cm and over in girth at b.h.(o.b.)

Trees of all other species of and above 60 cm girth at b.h.

(iii) All remaining trees marked will bear serial number, which will be given by coaltar. The digit and coaltar serial numbers will form separate series. Malformed trees alone will be recorded as fuel trees except that of teak. A tree will be classified as fuel tree only when it is incapable of yielding any useful sawn timber or pole.

All trees bearing serial number will be individually recorded in marking (recording) book giving following details :

Serial Number		Species	GBH(OB) in centimeter	Remarks
Digit	Coaltar			
1	2	3	4	5

(v) Abstract of trees marked for felling will be made in 15 cm girth classes. Timber, poles and firewood trees will be shown separately.

(vi) The number on the trees will be put in the vertical direction as shown below :

2
Tree No. 216 → 1
6

SECTION : 11.2: HARVESTING AND DISPOSAL OF FOREST PRODUCE :

11.2.1.1. TIMBER AND FIREWOOD : All coupes of main felling will either be worked departmentally or allotted to Forest Labourer's Cooperative Societies. All timber and firewood will be extracted to the established Government depots for sale in open auction. The quantity of timber, poles and firewood, to be given on nistar at concessional rates, will be kept separately in these depots.

11.2.1.2. TENDU LEAVES : With the enactment of “Maharashtra Forest Produce (Regulation of Trade) Act, 1969”, the trade in tendu leaves has been nationalized. The disposal of this produce will be done in accordance with the provisions of this Act. In all 23 tendu units have been formed.

11.2.1.3. BAMBOOS : Bamboo will be harvested in accordance with the prescriptions laid down in Bamboo Overlapping Working Circle. After harvesting, the bamboos will be brought to the various depots set up for distribution of bamboos to Burads and agriculturists at the rates fixed by the competent authority. The excess of unlifted bamboos will be sold in open auction.

11.2.1.4. GRASS : Disposal of grass from closed coupes will be done as per instructions contained in Government Resolution No.MFP 1169/118931 - (6)- F2, dated 29-10-1976 i.e grass from closed coupes will annually be offered on cutting terms to the Gram Panchayats or public bodies or F.L.C.S. in the neighbouring area at a reasonable price to be fixed by the Department, considering the availability of grass and current market trend. If the concerned Gram Panchayat or the other public bodies are not coming forward to take those areas, then grass may be disposed of either by public auction or by rated passes. In order to persuade the villagers to stall feeding, the grass may be allowed to be removed even free of cost without damaging the forest.

11.2.1.5. GUM, LAC AND SITAFAL FRUITS : To collect natural gum, sitafal fruits the areas may be sold by public auction. Unauthorised tapping or making injuries to trees to collect gum is not permitted. Gum shall be tapped as mentioned in Non-Timber F.P. Working Circle.

11.2.1.6. HONEY, WAX, BROOM GRASS, HIDES AND HORNS: There are not much quantities available of these items. Broom grass may be sold by public auction. Collection of hides and horns have been completely banned as per the amendment to Wild life Protection Act, 1972 Other may be allowed to be removed by local villagers either free or at nominal rates, decided by the Conservator of Forests.

11.2.1.7. GENERAL : Sound and young growth of all important species yielding Non Timber Forest Produce such as moha, charoli, harra, aonla, tendu fruits etc. will be retained in areas earmarked for harvesting in such a manner that they are suitably dispersed and would also serve as a subsidiary crop to main species and constitute a source of availability of Non Timber Forest Produce to the local people.

SECTION:11.3: IRREGULAR HARVESTING :

11.3.1.1. Irregular harvesting of timber, firewood and other Non Timber Forest Produce is prohibited, except in the following cases :

Removal of dead fallen firewood and trees uprooted by wind or storm all parts of the forest, except the coupes due for working, will be done in the following manner. Every year in the month of October each beat guard will report compartmentwise the availability of dead fallen firewood and trees uprooted by wind or storm to the concerned R.F.O. The R.F.O. will then prepare compartment wise estimates for such material. Then marking by compartment will be done if the number of such trees is more than 2 per ha as this much number will be required to be left in the forest to decay in order to benefit the wildlife in the forest. After the approval of estimates by the Deputy Conservator of Forests, harvesting will be done and the material will be taken out of the compartment and it will be brought to the sale depot and sold in open auction. The details in material obtained from each

compartment, number of beneficiaries and revenue realised from it will be entered in the respective compartment history form.

Felling of trees on fire lines will be carried out as per orders of the Dy. Conservator of Forest, without reference to the Conservator of Forests.

Felling of trees under electric and telephone lines existing prior to coming in force of Forest Conservation Act, 1980 may be carried out by the Dy. C.F. as they do not come under the purview of the Forest Conservation Act, 1980.

Felling of trees on forest land required by the other departments such as Irrigation, PWD. etc will be undertaken only after approval of proposals for the use of forest land for non forestry purposes by the Government of India under the provisions of Forest Conservation Act, 1980. The material obtained from such harvesting will be brought to the depots and will be disposed of along with regular coupe material. Teak plantation not included in old teak plantation working circle can be thinned according to its regime. It will not constitute a deviation.

The disposal of forest produce obtained from submergence areas of dams and tanks, from construction of roads etc will be carried out according to the orders, issued by the competent authority, in writing, in case of sanctioned projects. However any plantation taken in addition to sequence prescribed shall not constitute irregular in nature. The same will hold good for the soil and moisture conservation works.

No irregular harvesting for the purpose of undertaking plantations / afforestation work under schemes outside the scope of this working plan will be taken up in any of the areas under this working plan. The felling of bamboo outside the area falling in working circle for bamboo (overlapping) will not constitute a deviation and can be disposed by the D.C.F. (Territorial) as per rules. Similarly the disposal of high stumps will not constitute a deviation. However before felling, each high stump will be marked and some proportion of it duly verified by A.C.F. The felling of trees for the purpose of growth study, volume table or yield table to be carried out by the working plan division will need no permission, except giving the details of the plan of work to be concerned Dy. C.F. well in advance. Felling should be strictly as per the objectives of the work.

SECTION: 11.4 SCATTERED BAMBOO AREA MANAGEMENT:-

11.4.1.1. All areas having substantial bamboo has been included in Bamboo overlapping working circle. However there are still some areas, having few clumps, which could not be included in that working circle, due to falling short of criteria fixed for that. These remaining area of division, will be divided in (3) groups of A,B & C, compartment wise and an appendix will be prepared locally. The felling of bamboo will be then carried out on the silvicultural line, as per prescribed rules, for meeting nistar demand, and departmental use including sales.

SECTION: 11.5: MAINTENANCE OF BOUNDARIES :

11.5.1.1. With reference to legal status, the forest areas within the tract dealt which can be classified as Reserved Forests, Protected forests, and Unclassed Forests. The maintenance of boundaries of these three classes are described as follows :

11.5.1.2.RESERVED FORESTS : Reserved forests boundaries are being maintained by traditional boundary pillars known as cairn class I and cairn class II. Due to increasing population, the biotic pressure on forests has been increasing and it has crossed the threshold. This has resulted the encroachment mentality of the people. So far the number of cases of encroachments in R.F. of the tract is almost nil as per the record but pressure is tremendous. Therefore, looking into the future of the forest, it is essential to change the external boundary pillars from traditional to R.C.C. pillars of standard shape and size approved by the Principal Chief Conservator of Forests, Maharashtra.

11.5.1.3.PROTECTED FOREST : These areas are not demarcated by any type of boundary pillars. These are normally around the villages and therefore very vulnerable to encroachment. Therefore, survey and demarcation of the P.F. areas should be done on priority basis. R.C.C. pillars of standard shape and size approved by the Principal Chief Conservator of Forests, Maharashtra should be used as boundary pillars. This work should be started from the first year of the implementation of this plan.

11.5.1.4. UNCLASSIFIED FORESTS : New areas are being taken over from Revenue Department as land bank against compensatory afforestation. These were not demarcated. It's survey and demarcation should be done forthwith before taking any other action. The proposal for declaration as Reserved or Protected Forests should be mooted. So long as it is not declared either R.F. or Protected Forests, it should be demarcated by R.C.C. Pillars of convenient shape and size to avoid chance of encroachment. After notification of the same under section 20 or 29 of IFA, 1927, the same should be demarcated by R.C.C. pillars of standard shape and size approved by the Principal Chief Conservator of Forests, Maharashtra for reserved/protected forests.

11.5.1.5. For sake of uniformity through out the state, the shape, size and estimate in terms of mandays of the R.C.C. boundary pillars for both R.F. and P.F. have been approved by the Hon'ble PCCF. Details of RCC boundary pillars and estimate will be given appendix no XXIX.

11.5.1.6. The internal boundary marks/pillars/cairns/ will be traditional and maintained as per the 1/5 th boundary demarcation and verification scheme, which is given in Appendix no XXIX. Where natural features form the boundary, demarcation need not be done either by R.C.C. or traditional boundary pillars.

11.5.1.7. BOUNDARY LINES : The width of the cleared line of outer boundary of the forest will be 13 metres (40 feet). Nothing will be cut growing outside the true forest boundary line. The clearing will consist of cutting down only all the undergrowth that impedes the view, preventing one forest boundary mark being seen from its neighboring one. Trees on the boundary lines will not be cut down so long as they do not obscure the view of the boundary marks one from the other.

11.5.2. BOUNDARY MARKS/PILLARS SPECIFICATION :

11.5.2.1. The specifications of RCC pillars boundary marks/pillars and the method for demarcation shall be as per the direction given by Office of Principal Chief Conservator of Forests, Maharashtra State vide his Letter No 68 dated 29.5.2001(Marathi) and appended as Appendix no XXIX.

11.5.2.2. SHAPE : A truncated cone.

11.5.2.3. DESCRIPTION : The cairns will be built of loose stones upon an excavated foundation so that the lowest tier of stones will be held in position and not pushed out by the weight of the superstructure, especially when the ground becomes wet and slippery. The interspaces between the large stones composing the cairn will be filled in with small stones and the outer stones will be wedged with stone chips. A stab stone or a central stake of teak or khair projecting 50 cm will be fixed firmly on the top of the cairn in the centre.

11.5.2.4. FOUNDATION : It will be 30 cm dug out in the soil.

11.5.2.5. DIMENSIONS : A cairn will have a base of 1.8 metre diameter, 1.2 metre high and the top diameter will be 1.2 metre (vide para 64, vol.I of CENTRAL PROVINCE and Berar Forest Manual, Fifth edition).

11.5.2.6. INDICATOR : A slab stone of size 0.2m x 0.2m x 0.9 m or a stake of teak or khair projecting 50 cm above the cairn will be embedded firmly in the centre and a serial number will be put on it.

11.5.2.7. COLOUR WASH : The slab stone will be colour washed red in case of closed forest and white in case of open forest and lines of the same colour will be applied on the top of the cairns radiating from the centre slab stone to show the direction of the boundary lines.

11.5.2.8. POSITION : The boundary marks (cairns) will be placed at visible distance one from the other, so that from any mark it's neighbouring one on both sides can be seen clearly. Where there is no change in direction over a large distance, the boundary marks will be erected at intervals not greater than 250 metres. Each cairn will bear a serial number, a separate number will be given for each adjoining village.

In addition to the boundary marks, tin plates will be fixed on the boundary trees at a height of 3 m above ground, preferably at the boundary of two compartments. These plates will indicate the compartment numbers with arrows and below them will be pillar numbers on either side of the plates. The metal plates will be size of 45 cm x 45 cm . They will be painted white and compartment number and boundary pillar number will be written in red.

11.5.2.9. While carrying out annual maintenance, the following points need special attention that the pillars are correctly located as per map and demarcation register, that the forest boundary is cut to the required width, that the repairs to the cairn is done. that the boundary post bear the correct number and the same is engraved and written coaltar or paint, that there are no encroachments.

If there are any encroachments or are suspected, the matter should be pursued and all legal measures should be taken to remove the encroachments.

11.5.3.1. Rules for inspection and maintenance of forest boundary marks :

(i) The forest guard of the beat will be responsible for the maintenance and protection of all the boundary marks in the forests of his beat. He himself will colour wash them annually after rains and will make a special report of having performed this work. Each forest boundary mark in his beat will be specially inspected by him at least once every year, and a record of his inspection will be entered in his diary.

(ii) The Round Officer will be responsible for the maintenance and protection of all the boundary marks in the forests of his round and he will see that they are maintained properly, repaired and colour washed by the concerned beat guard, as directed. The Round Officer will check all the boundary marks in a year which come up for maintenance and repair as per the 1/5th boundary demarcation scheme. A mention of this will be made by him in his diary. The Round Office will annually submit to the Range Forest Officer a certificate in the following format :

“I, ... Certify that the annual length of boundary lines in my jurisdiction as prescribed under the scheme given in Appendix no XXIX of the working plan for the Central Chanda Forest Division has been verified by myself personally on ----..... and that boundary lines and marks and pillars are found to be correct as per the demarcation registers and maps. I, further certify that next cairns on either side of a cairn are visible and they are in proper condition and bear correct serial number. There are no encroachments or are encroachments as detailed below :

(iii) The Range Forest Officer will check at least 25% of the annual boundary line as per the 5 year programme and 5% verification will be carried out by the ACF.

11.5.4. MAINTENANCE OF COMPARTMENT BOUNDARIES :

11.5.4.1. The compartment boundaries will be cleared to a width of 3 metres, except where the same runs along big nala or road. Rectangular tin plates of size 30 cm x 30 cm will be fixed with nails on the trees at 3 metre height standing on the boundary of the compartment at regular intervals of 250 metres and also at all the corners. After painting the tin plates white, the compartment numbers will be written on them with red paint.

11.5.4.2. Legal provisions available for protection of the boundary marks. Under section 26 (c) of the IFA, 1927 altering, moving, destroying or defacing any boundary marks of any forests to which the provisions of this Act apply, is punishable with imprisonment for a term which may extend to two years, or with fine, or with both. This offense is non-compoundable under section 68 of the above Act. This legal provision should be made use at all levels by the field staff. Strict watch will be kept on the persons who do so and they should be booked under the above provisions contained in IFA, 1927.

SECTION: 11.6: FOREST FIRE AND PROTECTION MEASURES :

11.6.1.1. We can have eternal forest only when regeneration and its establishment is normal. One of the important reasons for poor regeneration and its non establishment is fire. Thus fire is directly responsible for degradation of the forest. The operations prescribed in this

plan will have beneficial effects only if rigid fire control is observed in the whole forest, in general and the worked areas in particular.

11.6.1.2. To find out solution of the problem, it is essential to analyse it and to know the probable root causes of the problem. Without knowing the root cause, trying to find out the solution is nothing but beating about the bush. The meretricious fire protection works cannot be of any help. Therefore, before coming to the solution we look into the probable reasons of forest fire.

11.6.1.3. The following are probable reasons of forest fires :

(a) TENDU COLLECTION : Every year permission for pruning is given to the tendu contractor. It is observed that either during the course of pruning or just after formal completion of pruning, invariably forest fire is seen in the forest. There are two reasons of this - firstly, pruning is not carried out in whole unit and so forest fire is used as the substitute of pruning. Secondly, it is a popular belief that fire injured stumps and shoots send out heavy and healthy flush of leaves. On this pretext expected expenditure on pruning is saved and whole forest is burnt. This is one of the most important reasons of forest fire.

(b) COLLECTION OF MOHA FLOWER AND FRUITS : This is also one of the important reasons of forest fire. Falling of moha flower starts normally at the end of February which is the beginning of summer. Moha flower is used in many ways by the people and so the local people collect moha flower. To make the collection easy, the leaf litter beneath the crown of Moha tree is burnt but fire is not controlled to confine around the moha trees only. Therefore, fire spreads in the forest and extends till it gets medium of propagation. Usually during this season medium of propagation of fire remains available for miles together and so fire extends for beyond the moha tree. This is very popular reason of forest fire but its extent is not comparable to that of fire caused by tendu contractor. Forest fire due to moha flower is seen only where there is no moha trees. Where as tendu contractor willfully burns each and every part of the forest having tendu.

(c) GUM COLLECTION : The local villagers set fire to facilitate movements in the forests for collection of Gums and other Non Timber Forest Produce.

(d) GRASS REGENERATION : In some areas, having good crop of grass is burnt by local villagers to have good future crop of grass.

(e) GRAZERS : Sometimes, fire spread through burning bidi stubs, thrown by the people passing through the forest. Due to excess grazing pressure each and every part of the forest is grazed and consequently grazers too roam the forest with their cattle. Most of the grazers are smokers who smoke bidi. They do not have so much sense of protection of forest and so indifferently and carelessly throw burning bidi stub which causes forest fire. This is also very important reason of forest fire.

(f) ENCROACHMENT : During the process of encroachment, material felled is usually burnt as they all can not be consumed by them. This burning is not controlled and so becomes one of the reasons of forest fire.

(g) SHIFTING CULTIVATION AND RAB BURNING : This is also one of the reasons but this problem does not exist within this tract.

11.6.1.2. Though there are a number of reasons as mentioned above yet the persons who set fire are local villagers only. This is most important facts to be considered for searching the solution to the problem.

11.6.2. MEASURES : Measures to solve this problem can be classified as follows :

Preventive measures. ii) Control measures. iii) Punishment measures:

a) Punitive b) Deterrent

11.6.2.1. PREVENTIVE MEASURES : Preservation is better than cure. This implies that the reasons of the problem are to be removed. If by some means people abide by not

bringing any agent of fire in the forest, occurrence of fire will not take place. This can be achieved by social or legal or both means. The methodology may be as follows :

Since villagers are setting fire for different reasons and objectives, they are required to be taken into confidence. This can be achieved by teaching and motivating them. The ill effects of fire should be known to villagers clearly. The respected persons of the village like teachers, sarpanch, police patil etc. should be taken into confidence and convinced first.

Once they are convinced with the philosophy of protection, they will easily convince other villagers through their own means. Thus the cooperation of the local villagers is of prime importance to ensure protection of the forest from fire. Repeated dialogue of forest officers with villagers will have to be made to keep such drive alive. This is, indeed, a permanent measure. To make this measure intensive, some people of the village should be involved in protection works and responsibility and benefit should be given to them by way of deploying them as fire watchers.

11.6.3. CONTROL MEASURES : TO HAVE EFFECTIVE FIRE CONTROL

FOLLOWING MEASURES WILL BE TAKEN :

11.6.3.1. CUTTING AND BURNING OF FIRE LINES : Following rules should be followed : (i) Cutting of fire lines will be completed by the end of December and burning will be completed before the end of February.

(ii) Dry leaves and other dry material on fire lines will be collected from time to time and deposited along the edge of fire lines and burnt before the fire season starts.

(iii) Except with the express permission of the Deputy Conservator of Forests, no fire lines will be burnt after the end of February. If such a permission is granted, the burning should be done in presence of the R.F.O.

(iv) Modern fire lighting tools will be used for extinguishing the fire.

11.6.3.2. DEPLOYMENT OF FIRE WATCHERS AND STAFF :

(i) There are a number of reasons, intentional or accidental forest fire but the persons involved in lighting up are the local villagers only. Therefore, it is very much essential to have a open dialogue with villagers and they should be made aware of the disastrous effect of forest fire. Repeated dialogue and persuasion can be of great help in solving the problem. Solution should be asked from them only. After doing all these things, area vulnerable to fire should be identified around each village and for that area a gang of fire watchers of that village should be employed, who will have the sole responsibility of fire protection of that area. If the village is big then a list of fire watchers should be prepared with taking meeting of villagers and having dialogue with them, rotational employment of fire watchers should be thought of.

(ii) Before the fire season starts, a scheme will be prepared in which the strategic locations will be marked on a map at which gang of fire watchers of 5 to 10 will be kept, who will supervise the area around that point and can reach the spot where fire is noticed. Daily reports from the fire watchers should be called for.

(iii) The staff associated with the fire protection work will monitor the working of fire watchers and will coordinate the working of different gangs located at different points.

(iv) The available vehicles will be deployed at strategic locations which can be approached by any gang, in case of help required by them. These vehicles will also help in transport of fire fighting labourers, water and other equipments required for extinguishing fire.

(v) The regeneration areas of SCI Working Circle will be given special treatments. For this, the area will be divided into 5 to 10 ha patches. For each patch one labourer will be kept, whose main job will be to protect the patch from the fire and grazing. In addition, he will do the work of cleaning, weeding and singling of seedlings.

11.6.3.3. Tendu collection being the most important reason for forest fire, introduction of protective measures in the policy of tendu leaves are required to be made so that the contractor could not be tempted to have more leaves from the unit purchased. This can be

done if the present system is changed and instead of selling units, tender should be called for collection of leaves. The collected leaves from all units should be brought at central places where it should be sold. This will be beneficial in many ways, such as the contractor will not have temptation of collecting more leaves from the unit as it is not certain that the same could be purchased by him so he will not indulge himself in forest fire. Second solution of the problem is that pruning provision should be freeze for 10 years and tender should be finalised between 15th March to 5th April. After that pruning should be permitted alternate year instead of annually.

11.6.3.4. Usually Moha collection is done from trees within a radius of 2 km. from the village site. Therefore, it is not difficult to locate such trees. All such trees should be enumerated and given serial number and compartment, beat, round and range wise information should be recorded. Since collection cannot be stopped therefore, we will have to allow them to clean the ground beneath crown of the tree to make easy collection. But thing is that this has to be done in controlled way so that it could not become the reason of fire to spread in the forest. For this, a list of showing the distribution of trees by numbers to different families should be prepared and then the concerned beat guard should get done the cleaning operation through concerned families before the start of falling of flowers. In this, if possible, the assistance of our permanent Chaukidar working in that beat should be made available to villagers. Besides, if budget permits a circular trench of size 30 cm x 30 cm with tree as centre and crown as diameter should be dug and dug up soil should be kept inside. This will act as preventive measures and obstruct spreadal of fire caused by moha collection.

11.6.3.5. No grazier should be allowed to keep with them match box and bidi while they go into the forest. They should be educated and motivated in this regard. The masters of graziers should also be talked to ensure strict implementation of the measures. Strict action against violation should be taken. Similar steps should be avoid chances of fire from gum collection.

11.6.3.6. Areas which are potential for grass production for local people should be recorded by compartment and control burning in those areas in presence of Beat Guard should be done.

11.6.3.7. To the maximum possible extent firewood should be taken out from forest on which fire survives and develops and the same should be given to the local people on nistar..

11.6.4.1. LEGAL MEASURES : All legal provision for prevention of fire should be followed scrupulously and they should be known to the extent possible to the villagers also.

11.6.4.2. PUNITIVE MEASURES : Under different sections of IFA, 1927; Wildlife Protection Amendment Act, 1991, Maharashtra Forests (Protection of forest from fire) Rules, 1982 , Maharashtra Non Wood Forest Produce (Regulation of Trade) Act, 1969; Maharashtra felling of trees (Regulation) Act, 1964 and under provisions of Bombay Forest Manual Vol-II , Part - IV the quantum of punishment and the proceedings are given. Punishments enshrined in above Acts are punitive only but as the per the gravity of the case, the H'ble court should be convinced for the maximum punishment prescribed. Besides, if the involvement of our staff is seen, they should be thrown out of the service by following procedure as a deterrent punishment so that no other could dare to repeat the same.

11.6.5. CLASSIFICATION OF FORESTS AS PER LEGAL PROVISIONS :

11.6.5.1. Fire is the dominant factor for non-establishment of natural regeneration and degradation of forest. The operations prescribed in this plan can have beneficial effects only if fire control measures are rigidly observed in the whole forest, in general, and the worked areas in particular. The mere ritual of fire protection works can not be any help. For the purpose of fire protection the areas are classified as follows :

11.6.5.2. CLASS I: FOREST COMPLETELY PROTECTED: This class will include:

(i) All main felling and thinning coupes of Modified SCI and old plantation Working Circles. The above coupes are to be rigidly fire protected from fire for five years.

- (ii) All roads passing through the forest.
- (iii) All Government depots.
- (iv) Any other areas of special importance ordered by the Conservator of Forests.

11.6.5.3. All areas in this class will be isolated by means of fire lines and cut guidelines and will be patrolled by the fire watchers.

11.6.5.4. Any fire occurring in them will be a calamity and must be reported to the Deputy Conservator of Forests immediately, in writing, giving details of the area burnt and the various types of losses occurred.

11.6.5.5. CLASS II : FOREST GENERALLY PROTECTED : This class will include :

- (i) The areas of Afforestation Working Circle.
- (ii) Broom grass areas.
- (iii) Such other areas the Conservator of Forests may, for special reasons, direct.

11.6.5.6. All areas in this class will be isolated from the surrounding country by means of external fire lines and will be divided into convenient blocks of internal fire lines. No guidelines will be cut. Fire watchers will be engaged for patrolling in this areas.

11.6.5.7. CLASS III : FORESTS PROTECTED BY LAW ONLY : All other forests, not included in the above two classes, are included in this class. In the forests of this class deliberate burning is prohibited, but no special measures for protection will be undertaken. The following lines will be maintained as fire lines and will be kept clear of all growth and kept clean of combustible material during the fire season.

- (i) All external boundary lines of Reserved and Protected Forests to a width of 13 or 40 feet.
- (ii) 6 metre wide lines around all regeneration areas, natural and artificial, upto 5 years from the year of planting or tending of natural regeneration.
- (iii) 3 metre wide coupe lines, in which regeneration operations have not been done and which form the boundary between class I areas and areas of class II and III for a period of 5 years from the year of main felling.
- (iv) 6 metre wide lines on both sides of all roads and cart tracks passing through the forest.
- (v) 40 metre wide line on all sides of the timber, bamboo and firewood depots.

11.6.5.8. LEGAL PROVISIONS IN THE IFA, 1927 : The various legal provisions to protect the forests from fire are contained in the following sections of the Indian Forest Act, 1927. The following acts are prohibited under these sections in the Reserved Forests area or in areas notified under section 4 of the IFA , 1927.

- (i) Section 26(i) b - to set fire to a Reserved Forests.
- (ii) Section 26(i)(c) - Kindling , keeping and carrying any fire except at such seasons as the forest officer may notify in this behalf.
- (iii) Section 26(i) (f) - Burning of any trees.
- (iv) Section 26(i)(g) - Burning of limestones or charcoal.
- (v) Section 26(3) - The State Government may suspend the exercise of all rights of pasture or to forest produce in the Reserved / Protected Forests or a portion there of whenever the fire is caused willfully or by gross negligence for such period as it thinks fit.

11.6.5.9. IN CASE OF VILLAGE FORESTS PROVISION IS AS FOLLOWS :

- (vi) Section 28(3) – All the above provisions apply in case of Village Forests too.

11.6.5.10. IN CASE OF PROTECTED FORESTS: In protected forests provisions are as follows:

- (vii) Any person who commits any of the following offenses under section 33(i) (a), (b), (d) and (e) namely, burns any tree reserved under section 30, burns any lime or charcoal contrary to prohibition under section 30, sets fires to such forests or kindles a fire without taking all reasonable precautions to prevent its spreading on any tree reserved under section 30 and leaves burning any fire kindled by him in the vicinity of any such tree or closed portion under section 30, shall be punishable with fine which may extend to two thousand rupees.

11.6.5.11. PROVISIONS CONTAINED IN THE MAHARASHTRA FORESTS

(PROTECTION OF FORESTS FROM FIRE) RULES, 1982 : The government of Maharashtra, vide Notification No.1074/252 359/F-6, dated 14/10/1982 under section 32(6) and 76(i) (d) of the I.F.A., 1927 made the rules for the protection of protected forests from fire called “The Maharashtra Forest (Protection of forests from fire) Rules, 1982”. The various provisions made under rules 3 to 7 are given as under :

Rule 3: A ban is placed on kindling fire within a distance of one km from the boundary of the forests.

Rule 4 : Under this rule any person desirous of clearing by fire any standing forests or grass land beyond a distance of one Km from the boundary of the forest shall observe the following rules :

(i) He shall clear a fire belt at least 10 metre wide on the side of the area, which he proposes to burn which is nearest to the boundary of the forest in such a manner that no fire can spread across such belt.

(ii) He should keep a fire watcher to see that the fire does not spread in the forest area.

Rule 5 : Under this rule any person desirous of burning “Rab” or clearing land by burning the growth on it near the forest boundary, should inform the nearest forest officer at least one week in advance of his intention to do so. A clean belt of at least 10 m width should be left in between the boundary of the forest and the place where the rab is to be burnt so that the fire does not spread in the forest and while burning the rab he should make such arrangements so that the fire does not spread in the forest area.

Rule 6: Under this rule any person collecting inflammable forest produce such as grass, firewood, leaves, bamboos on the land adjoining the forest land, and holder of a permit to collect such produce from the forest area, shall stack it in an open space at such reasonable distance from the forest as the Dy. Conservator of Forests may by general or special orders prescribe, and shall isolate the stacks in such a manner that if they catch fire, the fire will not be able to spread to the surrounding forest areas.

Rule 7: Under this rule all camping places along the boundary of an within the limits of the forest area will be cleared and will be set apart by the Dy. Conservator of Forests for the use of visitors. A list of all such camping places will be published annually and except on such camping ground no fire shall be lighted within or along the boundary of the forest. All persons using these camping grounds shall light any light for cooking or other purposes in such a way so as not to endanger the forest or any buildings, sheds or other property on the camping grounds and before leaving they shall collect in the centre of the camping ground all inflammable material which is to be left behind and shall carefully extinguish all fires.

Rule 8: Rules 3 to 7 will be relaxed during the rainy season from 15th of June to 31st of October.

11.6.5.12. PROVISIONS CONTAINED IN THE BOMBAY FOREST MANUAL

VOL-II, PART-IV.

Rule 152 : As per this rule the forest fire cases should not be compounded.

Rule 153 : It deals with the duties of the Magistrates, dealing with forest fire offence cases.

Rule 157 : It provides for the continuous protection of the valuable forests from fires.

Rule 158 : Under the provisions contained in this rule, if the forest fire is serious and due to repeated neglect by the villagers, then as an exception a communal punishment can be given with the sanction of the Government.

Rule 159 : It deals with the duties of the villagers.

Rule 160: It deals with the powers of the forest officers to sanction rewards in cases of effective fire protection.

Rule 162 : It deals with the powers of the Commissioner to sanction rewards to the villagers for effective fire protection.

11.6.5.13. PROVISIONS CONTAINED IN THE WILDLIFE

(PROTECTION) ACT, 1972 :

(i) Section 17(i)(e) : Under this section setting fire to any vegetation for hunting purposes is prohibited.

(ii) Section 27(2)(d) & (e) : Every persons so long as he resides within the sanctuary is bound to extinguish any fire in such sanctuary of which he has knowledge or information and also he will help the forest officer in extinguishing the fire.

(iii) Section 30 : Setting fire to a sanctuary, or kindling any fire or to leave any fire burning, in a sanctuary by any person so as to endanger such sanctuary , is prohibited.

(iv) Section 32 : Use of explosive in a sanctuary by any person so as to cause injury or endanger any wildlife in such sanctuary is banned.

11.6.5.14. PROVISION CONTAINED IN THE MAHARASHTRA FOREST PRODUCE (REGULATION OF TRADE) ACT, 1969 : As per condition No.XII of terms and condition of contract for tendu for 1993, the Licensee, his representative and munshis and labourers employed by him for collecting tendu leaves shall be bound to assist in putting out any forest fire and to give information of any forest fire in their knowledge or vision to the nearest forest or police officer. The Licensee will be held responsible for any fires deliberate or accidental occurring in his Unit/Group of Units or in its close proximity during the above period for which he will be liable for penal action.

11.6.5.15. PROVISIONS CONTAINED IN THE MAHARASHTRA FELLING OF TREES (REGULATION) ACT, 1964 : As per section 2(e) of the above Act, burning trees on private lands is included in the definition of “Felling of Trees”, and such act on the part of any person without obtaining felling permission from the competent authority under section 3, is punishable under section 4 of the above Act. The punishment to be given by the competent Revenue Officer may extend upto Rs. 1000 /-. Besides, the tree so felled is also liable to be forfeited to the Government. As per the amendment to this Act, in 1989 the word Revenue Officer has been replaced by “Tree Officer”, who is a forest officer not below the rank of the R.F.O. The Dy. C.F. should get translated the provisions / rules in Marathi or vernacular language and printed copy be supplied to Gram Panchayat annually, well before fire season, and request should be made for assistance to control forest fire.

11.6.5.16. MEASURES TO ENSURE PROMPT CONTROL : After recurrence of the fire, the action left with us is to extinguish it as soon as possible to lesson the national loss and effect of fire. For this following steps and equipments are required to be used :

11.6.5.17. OCCURRENCE OF FIRE : As soon as the smoke is seen rising anywhere in or near the forest by the fire watcher’s gang located in that area, they will immediately rush to the spot of fire and extinguish it. At the same time, they will send a message to the staff associated with the fire protection work. This staff will inform the R.F.O. concerned and will arrange the help to fire fighting gang, by way of calling additional gangs adjoining to the area of fire and requisitioning the vehicles kept for this purpose. If the fire is noticed by the fire watchers or staff, outside their area, then they will take immediate step to inform the concerned staff and will proceed to the spot of fire. They will carry out the fire extinguishing work and will remain there till the concerned staff comes.

11.6.5.18. Utmost care will be taken to extinguish the fire and to quench the smouldering material absolutely. Filling earth over such material is found very effective. No official will leave the burnt locality till the senior most forest officer present on the spot directs them to leave after ascertaining and satisfying himself that no smouldering material remains.

11.6.5.19. USE OF WIRELESS : A scheme should be prepared for establishing the wireless network in the whole division so that the communication becomes easier and faster.

This will help not only in fire protection works but will also be helpful in overall protected of the forest.

11.6.5.20. The financial loss due to fire will be communicated to the Accountant General as per Appendix - 19 of Rule 148 of Bombay Financial Rules, 1959 and B.F.M. Vol. I, Rule 369.

11.6.5.21. RESPONSIBILITY : The Range Forest Officer will be personally responsible for the efficiency of fire protection in his range. The responsibility will be fixed on the merit of each case and after due enquiry by the Deputy Conservator of Forest. Where the forests of two ranges which are to be fire protected adjoin, the responsibility for efficient protection and cleaning of common fire line will rest with one of the R.F.O's to be selected by the

Deputy Conservator of Forests In case of common boundary between two divisions of the same circle, the above responsibility will be fixed by the Conservator of Forests on one of the R.F.O's and in case of the common boundary between two division of the two different circles, the concerned Conservators of Forests after mutual consultation, will fix the responsibility on one of the R.F.O.'s. The Deputy Conservator of Forests will be personally responsible for carrying out efficiently all protective (as envisaged under various Acts and Rules and regulations made thereunder) measures in the area of his division. The Deputy Conservator of Forests must satisfy himself that the exterior fire lines and other fire lines as mentioned supra have been properly cleared and burnt thoroughly before the end of February. He must be continual inspections enquire about the implementation of the various prohibitory orders and assure that sufficient protective staff is available to implement these orders. He must make frequent visits to the areas, where the incidence of fire are common. He must, during his tour satisfy himself, by constant enquiries and inspections, that no fires in forest areas any where have gone unreported, and that the areas of reported fires have been accurately estimated. These checks required extensive and through personal inspection by him. A strict watch should be kept on the tendu leave contractors and their agents who engage the local people to set fire to the forest floor in order to get good flush of tendu leaves and as a substitute of pruning. These fires are generally made between 20th Feb to 20th of March each year.

11.6.5. EVALUATION : For evaluation of the fire, following steps should be followed:

11.6.5.1. FIRE REPORTS : The Range Forest Officer will report the outbreak of fire in his area to the Dy. C.F. at once. Special messenger will be used if the fire extends over large area. The R.F.O. must maintain a proper communication and coordination between himself and his field staff so that no delay occurs in receiving a report on outbreak of fire by him and in further transmitting it to the Deputy Conservator of Forests

11.6.5.2. After the fire is extinguished, a detailed final report covering the area burnt and other details alongwith a sketch map will be submitted by the R.F.O. to the Dy. C.F. within 15 days after through inspection of the burnt area by himself.

11.6.5.3. The Deputy Conservator of Forests will submit monthly return (in prescribed proforma, Form No.IX-74) to the Conservator of Forests showing therein the serial number of fire, date of occurrence, cause, area- burnt, extent of damage and measures taken to extinguish it. This report will cover.

All fires in class I areas, all fires that have occurred in class II areas before and after the date fixed for completion of the line burning works prescribed in the previous paragraphs.

11.6.5.4. All records of fire will be shown on maps of scale 1" =2 miles and the record of fire will be filled in the concerned compartment history and the map will be attached to it. This work will be done both at the levels of the R.F.O. and the Deputy Conservator of Forests

11.6.5.5. A fire record will be maintained in the office of the Deputy Conservator of Forests showing name and the length of fire lines burnt and areas specially protected will be indicated on the map. Incidence of fire in class I, II and III areas in each range will be serially numbered in chronological order and the details of areas burnt will be shown on the map.

11.6.5.6.Area deliberately burnt for silvicultural reasons e.g. to destroy felling debris or to stimulate reproduction, will be executed from the scheme of fire protection. Such fires will not be reported unless they spread into a protected area. Deliberate burning is only permissible if prescribed in the working plan or sanctioned by the Conservator of Forests. The steps to cut back the badly damaged young regeneration in the naturally and artificially regenerated areas due to fires, will be undertaken by the R.F.O. in consultation with the Deputy Conservator of Forests

SECTION: 11.7 : NATURAL REGENERATION :

11.7.1.NATURAL REGENERATION :

11.7.1.1.Natural regeneration is profuse in the area which is protected from grazing and fire. When grazing intensity and local demand is moderate, the forest is usually denser and when these two are heavy, the forest is usually open or tending to become open.

11.7.1.2.The natural regeneration process starts under the protection of an old tree. An old tree surrounded by a mass of regeneration in descending size from the centre outwards is often a very noticeable feature. The regeneration of some species, the seeds of which do not germinate without treatment of some kinds, is rarely seen around the old or mother trees. It is very unfortunate for us to not having much knowledge about seed treatment of many miscellaneous species. But the beauty of the nature is that there are seed treaters in the forests with the service of which treatment of seed and propagation of miscellaneous species are going on. Such agents of seed treatment though not known but are existing in the balanced natural forests of miscellaneous species. Most of them are birds and animals. They love certain plants and plant community to survive. Monoculture can never provide such conducive environment for them.

11.7.1.3.The principal factors influencing natural reproduction, its survival and development are as follows :

- i) Seed supply,
- ii) Soil conditions and
- iii) Light conditions

11.7.1.4.Here the seed supply implies the supply of seeds suitable for germination. As discussed above all seeds do not germinate without treatment. But presently by and large this is beyond our control. Very less research work has been carried out in this regard. And therefore, we have to depend upon nature for this requirement for which we should try to have a balanced state of forest.

11.7.1.5.Some species, such as khair, tiwas, shisham, sissoo, tendu & salai can be propagated through root suckers. This is very good technique of propagation of these species. If such seedlings are saved from fire and grazing their survival is assured. For this circular trenched of size 20 cm x 20 cm with tree as centre and crown as diameter will be dug up to damage the root suckers. This operation should be done just before the growing season starts i.e. between 15th Feb to 15 March.

11.7.1.6.The soil condition is very important for germination of the seed and providing food for establishment and development. The over grazed soil can not help to germinate and support the germinated seedlings for their further development. If the soil is compact due to heavy grazing the natural regeneration in such areas can be promoted only by ripping the soil and controlling the grazing. Again the ripping is technical, we can not apply the same method of ripping every where. For this all the soil and moisture conservation principles should be applied. In a ripped area, continuous trenches, to the extent that rainfall is completely absorbed, should be taken along contour, so that the added probability of soil erosion due to ripping of soil could be reduced to minimum. The deficiency of soil generally does not occur in the forest area which are having balanced forest cover. If area is degraded

soil testing and appropriate measures to boost up natural regeneration should also be thought of. Since ripping in entire area is not practicable and therefore, mother trees @ 30 per ha

uniformly spread over whole area should be selected. Around selected trees circular trenches of size 30 cm x 20 cm with tree as centre and crown as diameter should be dug and dug up soil should be kept inside. After doing so within circular area closed by continuous trench will be ripped. Ripping will be done in the angular area closed by between circular trench and circular area with radius 3m from the selected tree. This will be most successful in case of bija, dhora, teak etc. species. This operation should be done before rains.

11.7.1.7.Light condition is equally important right from germination to establishment and development. All natural processes are dependent on light (sunlight), the most important source of energy. Therefore, the floor of the forest needs light for germination of seed and after germination for establishment the required quantity of light should be provided by removing its competitor for light. This implies the removal of weed growth. For the favoured seedlings all other growth of species should be treated as weed and they should be removed. In the tract dealt with is having thick bamboo regeneration which is acting as weed for other species.

11.7.1.8.All above mentioned efforts are shattered by the repeated fire. Fire burns seedlings and deteriorates soil condition. Though sometimes controlled fire helps in regeneration but never uncontrolled fire. Due to uncontrolled fire, seeds of most of species are burnt and therefore, regeneration of grasses and weeds come up. Therefore, the uncontrolled fire is the enemy of the forest in all respect.

11.7.1.9.Thus factors affecting adversely to natural regeneration are grazing, fire and weed, which are within our control. Controlling these factors, measures have been suggested under respective sections. Effective implementation of measures suggested and observing the facts as mentioned above, natural regeneration can be promoted without any difficulty.

SECTION: 11.8 : ARTIFICIAL REGENERATION :

11.8.1. PLANTING OF TEAK AND MISCELLANEOUS SPECIES :

11.8.1.1.In the areas suitable for planting teak and miscellaneous species, planting will be done in the year following the year of main felling. Teak will be planted through stumps and miscellaneous species will be planted through polythene bag plants. Root trainer seedlings of teak can also be tried. The details of various works will be as follows :

11.8.1.2. PREMONSOON WORKS : They will be carried out in the year of main felling alongwith the felling. They will include following works :

11.8.1.3. FENCING : The whole coupe if 70% area is to be planted otherwise compartment will be taken for fencing by T.C.M. (Trench Cum Mound) of standard cross section of 1.90m x 0.60m x 1.0m will be dug where the boundary runs along the contour. No.T.C.M. will be dug when the boundary of the coupe runs across the contour or inside the compartment. In that case, live-hedge fencing will be taken. Live hedge fencing will consists of two outer rows of agave 50 cm apart and 3 inner rows, 50 cm apart, on which sowing of seeds of fast growing thorny trees like Acacia senegal, babul etc. and planting of cutting of shrubs like vitex, dodonea etc will be done after monsoon.

11.8.1.4. PIT DIGGING : For planting of miscellaneous species pits of size 30 cm x 30 cm will be dug. The dug up soil will be kept on the lower side of the slope. The pit digging will be completed upto 31st March and the soil will be allowed to weather during summer. Pit filling will be done at the end of May. The number of plants of teak and miscellaneous species will be 2500 / ha

11.8.1.5. NURSERY : TEAK : Teak stumps will be prepared from one year old seedlings raised in the beds as per standard nursery technique. Stumps should not be below thumb thickness. Besides, root trainer seedlings of teak (from seed) can also be tried.

11.8.1.6. MISCELLANEOUS PLANTS : Miscellaneous plants will be raised either in the polythene bags or poly tubes or root trainer. The standard size of the polybag plants suitable for planting will be when the collar of the plant is approximately thumb thick and woody in appearance. The height of the plants will vary from species to species. To achieve the

optimum sized polybag plants, the nursery work will be started latest by December in the previous year of planting. In case of root trainer, seed sowing should be done in last week of February. The polythene bags, after sowing of seeds of desired species will be properly watered. Shifting of bags will be done every 15 days, once the height of plants reaches ten cm. Care will be taken that each bag contains only one seedling. During the shifting, the bags will be arranged in descending order of plant heights. Suitable insecticides/fungicides,

fertilizer and manure will be given to the plants at regular intervals. Before planting, the planting stock will be examined by an ACF and he will certify the suitability of the planting stock.

11.8.1.7. FIRST YEAR OPERATIONS : As soon as the monsoon starts, seed sowing in 3 rows for live hedge fencing, described earlier, will be done by raking the soil along the line 10 cm deep. Planting of agave on the outer two rows of live hedge fencing at a spacing of 50 cm and planting of shrub cutting on the inner 3 rows, will be done. Teak stump by crow bar method after 1st shower of monsoon and after on set of monsoon and polybag/ poly tube / root trainer seedlings will be planted. The polythene bags will be planted in such a manner that their collars are at the ground level and it will be covered with soil upto a height of 5 cm above collar. All these operations will be completed in not more than 15 days after the break of monsoon.

11.8.1.8. SUBSEQUENT OPERATIONS : Immediately after the completion of planting, first weeding will be started. Casualty replacement will be done alongwith the first weeding. Second and third weeding will be done in the month of September and November respectively. The last weeding will include soil working and mulching to reduce the evaporation losses. One more soil working may be done in the month of January, if there is Winter rains, subject to the availability of funds. Weeding and soil working to the seedlings on live hedge will also be done in order to enhance their growth and survival.

11.8.1.9. In the second year of plantation, casualty replacement will be completed soon after the start of monsoon. Two weedings will be carried out in the month of August and November respectively. Soil mulching will be carried out at the time of second weeding. Debudding of teak plants, will be done in the month of April/May.

11.8.1.10. In the third year one weeding with soil mulching will be carried out in the month of September. Debudding will be done as in second year.

11.8.2.1. BAMBOO PLANTING : Bamboo will be planted, at a spacing of 6m x 6m, in the fourth year from the year of planting in afforestation or other working circles. Besides, bamboo planting in other suitable areas can also be thought of. The details of various works will be as follows :

11.8.2.2. PREMONSOON WORKS : They will be taken in the third year from the year of planting or main felling in suitable coupes of afforestation or other working circles. Pits of size 45 cm x 45 cm x 45 cm will be dug before March. The dug up soil will be kept on the lower side of the slope. Pits will be filled in the following year before the onset of monsoon.

11.8.2.3. NURSERY : Two years old bamboo seedlings with well developed rhizomes will be used for planting. The best method for preparing the good seedlings will be by establishing rhizomes bank at suitable sites in each range. Bamboo seeds will be sown in beds of size 12m x 1.2m x 0.3m. two years in advance of planting. In the month of February and March of the year of planting, seedlings from the beds will be transplanted into polythene bags after cutting their branches above 3 to 4 nodes. They will sprout within 15 to 20 days. After sprouting, suitable fertilizers will be given to get the vigorous growth.

11.8.2.4. FIRST YEAR OPERATIONS : At the onset of the monsoon, the polypot seedling will be transported to the planting site and will be planted in pits. At the time of planting, suitable fertilizers and insecticides will be given to each plant in the pits. Casualty replacement will be done at the end of July or in the first week of August. Three weedings and soil working will be done.

11.8.2.5. SUBSEQUENT YEARS OPERATIONS : Casualty replacement and two weedings with soil working will be done in the second year. One weeding and soil working will be done in the third year. Insecticides will be used if there is insect attack.

SECTION: 11. 9 : SOIL AND MOISTURE CONSERVATION :

11.9.1.1. With the increase in biotic interference in the forest areas, the forests are becoming degraded. The annual fires are enhancing this process. As a result of this, the forest floor is becoming compact and is being exposed to sun and rain, thus becoming vulnerable to erosion. The areas adjoining to human habitation, specially the protected forests, have become devoid of vegetation by way of illicit cutting, heavy grazing and repeated fire. The soil erosion has increased in these areas. In the worked coupes also soil conservation works are, generally, not taken. This also makes them vulnerable to erosion. The intensity of rainfall varies. The greater intensity of rainfall increases to run off from the forest floor. Rain water washes off alongwith it the exposed top layer of the soil. The compaction of soil reduces percolation and water holding capacity of the soil. This decreases the sub-soil water level. Extensive silvicultural works have been prescribed in this working plan among which soil and moisture conservation works are of primary importance to ensure improvement of the forest. Unless they are taken, the quality of the forest can not be improved in long run. They will include two main operations namely, contour trenching and nala bunding/check dams.

11.9.1.2. CONTOUR TRENCHING : Continuous contour trenching will be taken all over the coupe, due for working, where the density is below 0.4. In areas above 25 degree slope, trenches will be dug in accessible area only. The cross section of the trenches will be 60 cm x 30 cm. The soil from the trenches will be heaped on the lower side of the trenches. The boulders from the trenches will also be neatly stacked on the lower side. Grass tussocks planting, sowing of seeds of grasses and local tree and shrub species and planting of cuttings of vitex, dodonea, ipomea and bulbils of agave will be done on the heaps of the soil for its stabilisation. The contour interval between the consecutive trenches will be 1.5 cm. Depending upon the slope, the distance between the two consecutive trenches will vary. In order to determine the distance between consecutive trenches on flat areas, calculations are done:

If a = Average annual rainfall in mm in a year.

b = Rainy days in a year,

$c = a/b$, the average rainfall per rainy day in mm.

then $d = 10c$, is the rain fall in cubic metre/rainy day/hectare.

For the trench of size = $0.6 \times 0.3 = 0.180$ sq.mt., the length of trench in metre per hectare required to completely absorb water, trench in metre per hectare can be calculated as follows

$L = d/0.18$ in mt. and accordingly the distance between two consecutive lines can be determined. Taking an example of one hectare the distance between two consecutive trenches comes to $10,000 / L$ in metre.

The trenches near the nalas will be discontinued and will be curved upwards, on both sides of the nala, at an angle of 45 degree. This will prevent the run off of water, stored in the trenches, into the nala. The curved portion will be of 5m length on either side of the nala. The alignment of contour may be done by a simple water level.

11.9.1.3. NALA BUNDING/CHECK DAMS : The basic aim of nala bunds or check dams is to reduce the run off of water and to arrest the silt. Nala bunding will start from the top of nala downwards. Nala bunds/check dams will be prepared from the loose boulders found in or around the nala bed. No digging or blasting will be done. Where sufficient boulders are not available brushwood can also be used. Nala bunds will be prepared on nalas upto 8 m bed width. Beyond that these structures will not be useful and permanent engineering structures will be required. These structures are not being prescribed here. For the design of nala bunds, the nalas have been divided into three categories, namely:

- (i) upto 4 m bed width,
- (ii) between 4m to 6m bed width and
- (iii) between 6m to 8m bed width.

The details of nala bunds will be given in Appendix no XLXII. The important points to be kept in mind are as follows :

- (i) Nala bunds should be started from one side of the bed.
- (ii) Semi circular boulder pitching should be done on the top of the bunds, so that the stones are compact and are not washed away by water.
- (iii) The batter on upstream and downstream should be 2/1 and 1/1 respectively.

The distance between the successive bunds will be such that standing on the site of lower bund the base of upper bund should be in line of eye sight of the person, standing on the nala.

SECTION : 11.10 : GRAZING CONTROL :

11.10.1.1. This is one of the most important factors, responsible of poor regeneration and degradation of forests in the tract dealt with. The tract is heavily burdened with grazing. The rate of increase of population of cattle is tremendously high. For grazing forest is the only shelter. Besides with cattle religious sentiment is also attached. At such a difficult situation, finding out solution is not so simple. Rotational system or any other system of open grazing is not going to help much and this cannot be permanent solution to the problem. The population explosion has made us puzzled.

11.10.1.2. The steps of solution requires strong determination, full confidence of getting success and immense patience. Though it appears funny but no other solution is seen, except proposing the following.

11.10.1.3. Community Cattle Shed : People rear cattle not for milk but mainly for cow dung as source of compost and calf as a source of bullock. In tribal area, tribal people do not even take out milk and taking out milk is taken as against "Dharma". The number of cattle is regarded as status symbol as well. Now a days under different developmental schemes subsidised gobar gas plant is being pushed in the villages, which requires cattle to function. The cattle shed will comprised of ashed for cattle to keep them; small campus around which there will be a gallery in which all cattle will walk 10 rounds daily both in the morning and evening; feeding tubs of R.C.C. with concrete platform, a chauffer for every five such cattle sheds; one tractor to bring fodder for every 5 cattle sheds; silage unit in each cattle shed, fodder storage hall in each cattle shed, gobar gas plant in each cattle shed, a small complex of two rooms, a hall, a office, latrine and bath room and water supply system. Activities to be taken are to nurse cattle with all regards as per the Hindu belief and faith; to take all measures of family planning of all those cattle who have already given 3 calves; to improve the breed by cross insimination by bulls of improved breed, keeping them in the cattle shed; preparation of gobar gas for campus utilization and supply of FYM in proportionate basis to villagers whose cattle will be taken; provide adequate medical care and do research on breed with the help of Z.P. doctors for this purpose. For management each cattle shed will have one forester and two-three guards depending upon the size of shed. For all cattle sheds in the range, there will a R.F.O. For every 20 cattle (grown up) 1 labour will be provided. For fodder supply the whole responsibility will be of forest department. Grasses in Pasture and plantation areas will be kept reserved for this purpose. To enhance its productivity appropriate measures will be taken. The produce of the cattle shed will provide part of the finance. The price of the produce will be fixed by the Committee consisting of Dy. C. F. as Chairman, R.F.O. as member secretary, Sarpanch and one or two respected persons of the village as member. First right to purchase will be of villagers and they will be supplied relatively at less price. FYM will be given free of cost to them. From the selected village, all unwanted and non-milching cattle will be brought to the community cattle shed and record by shed of cattle will be maintained. With above proposition, the entire area will be covered with stall feeding practices which is so far confined to the pages of text books.

The silage prepared at cattle shed can also be supplied to the local villagers. With the success of this the free or open grazing will be completely stopped which will be a golden time for the forestry.

11.10.1.4. As per existing procedure open grazing is allowed based on functional classification of forests. Grazing settlement was conducted and grazing zones and units have been formed. A functional classification of the forest is given in section 2 of Chapter I, Part II as enunciated in the grazing policy formulated by the Government of Maharashtra vide its resolution No.MFP-1385/132211-Y, dated 8-12-1968. Grazing will be controlled till the complete success of stall feeding as per the prescribed grazing incidence for each class of forest in the interest of forests and pasture to minimise the damage from it. As per the provisions contained in A-259 of B.F.M. Vol II, Part VI, coupes can be closed to grazing for a period upto 10 years or more where it is difficult to get successful regeneration in a shorter period. Keeping in view the above provisions the grazing in various working circles of this plan will be regulated as follows :

(i) SCI FORESTS (ALL AGED MISCELLANEOUS AND ALL AGED TEAK) WORKING CIRCLE AND OLD PLANTATION W.C. : As per functional classification , these working circles comprise of tree forests and the maximum incidence of grazing prescribed for it is 1.2 ha per cattle unit. All main felling coupes will remain closed to grazing for a period of 5 years from the year of main felling. Thus with a felling cycle of 15 years, 5/15th or 1/3rd will remain closed to grazing at any time after 5 years from the commencement of this plan.

(ii) AFFORESTATION CIRCLE : This working circle comprises of minor and degraded forest and the maximum incidence of grazing prescribed for it is 0.8 ha per cattle unit. As main felling coupes will remain closed to grazing for 5 years from the year of main felling. Thus with a felling cycle of 10 years, 5/10th of 1/2nd are will remain closed to grazing at any time after 5 years from the commencement of this plan.

11.10.1.5. Thus as per the prescriptions of the working plan, number of cattle units can graze in the forest area at any time will be calculated. The remaining cattle can be accommodated by taking fodder development works in the community lands in these villages which can be done by the Social Forestry Department, Village Panchayat , Forest Protection Committee or voluntary agencies. Villagers should be motivated for this. At the same time the villagers will be persuaded to stall feed their cattle, the grass for which will be allowed to be removed from the closed coupes. They will be made aware of the ill effects of excessive grazing on the forest growth. Besides, the staff should have dialogue with the local villagers to discuss the issue. The Dy. Conservator of Forests should think for rotational grazing in areas which are not due for working. The experiment on silage preparation should be conducted and through this, stall feeding should be advocated. The preparation of silage will solve the problem completely. People should be motivated for rearing cattle in less number of better breed to have better return and less problem.

SECTION : 11.11 : REQUIREMENT OF THE PEOPLE FOR VARIOUS FOREST PRODUCE :

11.11.1.1. No attempt has been made to estimate or quantify the requirement of the people for small timber, firewood, poles and bamboos. The Deputy Conservator of Forests should , on priority, do this exercise. For estimation point of view a few villages should be chosen randomly as a sample and should be studied thoroughly. On the basis of the data so obtained the requirement of different forest produce should be obtained statistically. For the management point of view and to decide the priority over distribution, the data collection and estimation should be made separately for tribal families, families having land upto 5 hectare, and families having land more than 5 hectare. This classification is necessary as the consumption of forest produce depends upon economic status of the people.

11.11.1.2. FIREWOOD : The large scale illicit cutting due to firewood is going on in this tract. The problem is becoming grave day by day. Fortunately the North Chandrapur Circle has potential for firewood in large quantity. If the problem is thought on circle level for all divisions, the solution will become easy. Supply of firewood for commercial purpose to prepare charcoal should be stopped. After meeting the local requirement if some thing is left, only that could be made available to contractors. The mode of supply and rate should be decided by the Conservator of Forests. Pumping, of firewood to different villages through

department involving sarpanch will be beneficial in many ways. The market available to illicit cutter will be closed, service to society will be done; confidence, good will and support of villagers through sarpanch become available. These activities are also in consonance with the new forest policy of India.

11.11.1.3. BAMBOO : For Bamboo too similar arrangement should be made. Only after meeting the requirement of the local population, bamboo should be made available to any industry. The supply of bamboo to a given place and given duration be made through the industry working in this area and distribution of the same to the people should be done through department only. Supply should be on regular basis during the operation of extraction of bamboo by the industry. Burads and artisan should be protected by giving special attention to them. This will close the door of illicit cutting due to non-availability of market to them for the same. This will avoid large scale destruction which is going on in the forest.

11.11.1.4. There always exists a gap between the demand and supply and therefore, the forests are under pressure. To minimise the pressure, the gap between the supply and demand can be bridged by raising plantations in village community lands and wastelands with the help of Social Forestry Department, by involving the local people. At the same time people can be persuaded to minimise their consumption of forest produce.

SECTION: 11.12: ILLICIT CUTTING :

11.12.1.1. There is a problem of organised illicit cutting by gangs of criminals in the forest of Ballarshah Range and illicit cutting by villagers in forest areas adjoining to villages in all ranges. Besides, the large consumption of forest produce by the local people, as described in section 10 above, has put tremendous pressure on these forests. This has resulted in deterioration of forests adjoining to the villages in general and forests in Ballarshah in particular. For effective control on illicit cutting one mobile unit, consisting of one R.F.O., 4 foresters and 8 forest guards and unit should have vehicle. This unit will continuously patrol the forest areas vulnerable to illicit cutting.

11.12.1.2. The Government vide letter No. TRS 1087/102380/F-2, R & F.D., dated, 18th June, 1981 has stated that all illicit cutting valuing Rs. 25,000 /- and above at a place should be reported to the Government, the Chief Conservator of Forests and the Conservator of Forests by the Deputy Conservator of Forests within three days of he receipt of the report of the R.F.O. The following time schedule has been prescribed for inspection of illicit cutting area by the respective officers :

Sr.No. inspection	In situ value of illicit cutting at a place	Designation of the inspecting officer	Period within which inspection should be completed
1.	Upto Rs. 25,000	R.F.O.	3 days from detection/ receipt of intimation of detection
2.	Above Rs. 25,000 but not exceeding Rs.1,00,000.	A.C.F.	3 days from receipt of information
3.	Above Rs. 1,00,000 but not exceeding Rs.5,00,000	Dy.C.F	3 days from receipt of intimation of information
4.	Above Rs. 5,00,000.	C.F.	7 days from receipt of information.

Vide letter No. TRS-1082/36/F-6, dated 8th September, 1982 the Government has stated that the offence above Rs. 2000 /- should be necessarily brought to the court for prosecution, unless the prosecution is difficult to succeed.

SECTION: 11.13 : DEVIATIONS :

11.13.1.1. The following works will not be constituted as deviation from the plan.

i) Removal of dead and fallen firewood.

Petty fellings carried out as mentioned in irregular harvesting.

Works to be carried out as per sanctioned J.F.M. plan.

11.13.1.2. The following works will constitute a deviation from the Working Plan :

i) The felling and disposal of forest produce from submergence areas of dams, tanks, canal sites, road sides and other cases coming under the purview of the Forest Conservation Act, 1980. The sanction to it will be obtained.

ii) All other deviations can be classified into following two categories as per draft amendment to article 191 and 192 of Working Plan Code vide Agriculture and Forest Department Government Resolution No. FWP 1062/5625(ii)-J, dated 25.5.1962.

A) Deviations :- which would seek to alter the schedule of working given in the Working Plan, the examples of which are -

i) Both non-working a coupe in the prescribed year or working the coupe in the year not prescribed by the plan.

ii) Changes in the areas of coupe on account of disforestation or undertaking areas for execution of any special scheme under plan-programme; and

(B) Deviations : which would involve alteration in the silvicultural treatment, for example;

i) Stopping or curtailing fellings or planting because of shortage of labour, funds, material for plantation work, or unsuitability of terrain and soil for undertaking plantations to the extent prescribed by the Working Plan.

ii) Extensive fellings of dry trees killed by fire, fungus, insect attack or other natural calamities.

iii) Fellings of unusual size and extent for special departmental works.

iv) Special fellings to meet a sudden new demand of a particular industry.

v) Fellings involving modifications in the prescribed marking rules.

11.13.1.3. PROCEDURE FOR OBTAINING SANCTION FOR DEVIATIONS: All types of deviations are to be got approved from Central Government as per the instructions contained in Government of India Ministry of Agriculture No 6 – 14/84/FRY/(WP).dated 23.08.1984. Hence in case of the deviation of any type, the (Territorial) Deputy Conservator of Forests of Central Chanda Forest Division will submit, in eight copies, the proposals of deviations to the Conservator of Forests (Territorial) South Chandrapur through the Deputy Conservator of Forests Working Plan Chandrapur II. Who on scrutinising the proposals will forward them to the Territorial C.F. with his opinions and report as to the manner, the departure decided upon should be recorded. The C.F. territorial will pass on the proposals to the P.C.C.F.(MS) through C.F. WP with his remarks. Then P.C.C.F. will forward the proposals to the Central Government through the Government of Maharashtra with his remark for final approval. The standard proforma for submission of deviation proposals will be used.

11.13.1.4. The sanction to all deviations will be obtained. Application for sanction to such deviation will be submitted sufficiently in advance, so that sanction may be received as far as possible before the deviation occurs and without fail before the annual list of deviation is submitted alongwith the control forms.

SECTION: 11.14 : ROADS, CART TRACTS & CULVERTS :

11.14.1.1. The entire area is served by a network of roads. No new forest roads are proposed. Most of the roads are transferred to B & C. department for maintenance. In some roads cross drains are being properly provided to make them all Weather roads.

SECTION: 11.15 : BUILDINGS :

11.15.1.1. Residential : Adequate residential accommodation exists for the Range Forest Officers, Round foresters and few of the Beat Guards. Special duty Range Forest Officer, foresters and Beat Guards need to be provided with suitable accommodation.

11.15.1.2. Non-Residential : The range offices are housed in the pucca buildings. The existing accommodation needs to be supplemented by construction of additional room to each one of the range officers. On account of nationalization of tendu leaves, suitable additions and alterations may be carried out to accommodate the tendu clerk and the record. Adequate number of forest rest houses and inspection huts suitably located, exist in this tract. Additional rest house or inspection huts are not necessary.

SECTION: 11.16 : WATER SUPPLY :

11.16.1.1. The existing wells and tanks should be maintained in proper state of repair, cleaned and disinfected periodically. The list of water wells will be given in appendix no XVII.

SECTION: 11.17: PRIVILEGES AND CONCESSIONS FOR FORESTPRODUCE :

11.17.1.1. As per the National Forest Policy of 1988, the first charge on the forest produce is that of villagers living in and around the forest. Accordingly, the forest produce obtained from the forest will first be supplied to the local people at the rate fixed by the Conservator of Forests. The arrangement for supply of material will be made in such a way that the people should get the material within a radius of 2 km from their inhabitation. Only the surplus forest produce or the forest produce which is not required by the local people will be sold in open auction.

11.17.2. BAMBOOS : In Chandrapur District lot of Burads are there who prepare bamboo mats and other articles to earn their livelihood. Bamboos are required by agriculturists also. Their requirements are fulfilled through supply of bamboos from other divisions of the circle obtained from departmental or nistar coupes.

11.17.1.3.SMAL TIMBER, POLES AND FIREWOOD : Small timber and poles for agricultural purposes and repairs to houses and firewood for domestic use will be supplied from the depots and concessional rates, depending upon the availability of these produce. Depots will be opened at suitable places, throughout the division, so that people have to go to minimum possible distance to procure these produce. Range, round and beat headquarters should be chosen for this purpose, so that supervision and maintenance of these depots becomes convenient.

11.17.1.4.REMOVAL OF EDIBLE FLOWERS, FRUITS , SEEDS, OTHER MFPS : Collection of moha flowers and seeds, charoli, tendu, fruits, bor and other Non Timber Forest Produce may be allowed free to tribals and local villagers for their consumption. However, no forest produce will be allowed to be removed free for commercial purpose. During collection of any produce, no felling or hacking of trees will be allowed. In Schedule areas ownership over minor forest produce lies in gram panchayat as per Panchayati Raj Act. Hence collection and disposal of the minor forest produces will be through panchayat through its gram sabha resolution and forest department will maintain the hygiene of forests by enforcing silvicultural discipline while collecting minor forest produces by panchayat members.

SECTION: 11.18: SURVEY AND MAPS :

11.18.1.1. Forests of Central Chanda Forest Division except in Manickgarh Block have been surveyed on 4"=1 mile scale. All these forests have been stock mapped on 1 : 50,000 toposheets. For Manickgarh Forest Block many attempts had been taken in past to survey the areas but for the reasons mentioned in Part I of this document, the same could not be completed yet. It will need a special drive to complete the surveying and demarcation and preparation of realistic maps. As per the instructions contained in standing order No. 55 of the Conservator of Forests, Working Plan, the following sets of maps will be prepared :

11.18.1.2. DIVISIONAL MAPS : These are to be prepared on 4"=1 mile or 1:15,000 sheets. In all 5 sets will be prepared out of which two sets will be cut and mounted and 3 sets will be uncut and mounted, the details of which are as under -

(A) FOR Dy.C.F. WORKING PLAN : Two uncut and mounted sets called "Master sets" will be prepared having following details :

(i) One fair set indicating stocking details

(ii) One management map showing compartments, coupes, felling series, working circles, range boundaries and other management details.

(B) FOR Dy.C.F., CENTRAL CHANDA : One uncut and mounted and two cut and mounted sets showing the management details will be supplied to the Deputy Conservator of Forests One copy of the cut and mounted set will be for the use of Deputy Conservator of Forests and the Divisional Surveyor and the second cut and mounted set will be given to the concerned R.F.O.

11.18.1.3.MANAGEMENT MAPS FOR THE DIVISIONAL TERRITORIAL CONSERVATOR OF FORESTS AND THE CONSERVATOR OF FORESTS, WORKING PLANS : Two sets of maps on 1 : 50,000 will be prepared, one copy of each for the territorial Conservator and the Conservator of Forests, Working Plans. These maps will show all the management details viz comppts, working circles, felling series, range boundaries and other administrative details.

11.18.1.4.REFERENCE MAP : A small reference map on 1 : 2,50,000 scale showing range boundaries, compartments, working circles, felling series, roads etc. will be prepared and attached to each copy of the working plan.

11.18.1.5. GRAZING MAPS: On 1:2,50,000 scale showing Grazing Series will be prepared. One set will be kept in the Deputy Conservator of Forests Working Plan Office and the other set will be supplied to the Dy. C. F. Central Chanda.

SECTION:11.19: ENCROACHMENTS :

11.19.1.1.The problem of encroachments around the villages is prominent. The proper and correct demarcation and maintenance of the boundaries between Revenue Land and Forest Land is one of the main reasons of encroachments. As discussed earlier encroachment in Manickgarh Block in particular and Wansadi Range in general is on large scale and same is to be reflected on Revenue and Forest Records. A special scheme is required to be launched to demarcate Protected and Reserved Forests properly. The maintainance of the boundary will be emphasized. The beat guards will be provided beat maps alongwith the instructions in vernacular language. Records of encroachments will be made compartmentwise in the compartment history forms and will be shown on the map also.

11.19.1.2. The encroachment on forest land between 1972 to 78 are to be regularised by the Government vide two resolutions R & F D, LEN-1078 / 3483-F-G-1, dated 24th December, 1978 and R&FD-FLD-1079/1366-F3dated 12th September,1979. The present Government policy is very clear vide two resolutions R & F.D.No.FLD-1078/144074-F-3, dated 5th March, 1980 by which any illegal construction of hut on the forest land should be removed immediately and FLD-1087/PK-397/F-3, dated 14th July, 1987 stating that encroachment not likely to be regularised and taken place after 31st March, 1978, should summarily be removed. There is a need for a stringent measures against the encroachers.

SECTION : 11.20 : BEAT CHECKING :

11.20.1.1.To ensure strict protection of forest, it is imperative that the protective staff vigilantly patrol the forest entrusted to their care and the officers concerned exercise effective supervision and control at all levels. It is of the essence that every forest offence is reported with the utmost promptitude whether the offender there in is apprehended or otherwise and whether the forest produce involved therein is recovered or not. As per the standing order 37, Chapter IX, instructions issued for guidance and strict compliance with a view to tighten up the measures in regard effectual protection of forests are as follows :

11.20.1.2. The primary responsibility of forest protection devolves on the protective staff, which generally detects and reports the offence. The duties and responsibilities in regard to each category of the staff are broadly specified as below :

11.20.1.3. BEAT GUARD : Every guard must patrol his beat regularly. He will thoroughly inspect the entire forest within his charge every fortnight and issue P.O.R. for all the damage detected in each beat within the first instance.

11.20.1.4. ROUND OFFICER : Each Round Officer will inspect each beat once in three months. He should verify and enumerate the damage not reported by the beat guard. He will submit punctually the report of each area inspected by the Deputy Conservator of Forests through his Range Forest Officer.

11.20.1.5. RANGE FOREST OFFICER : It is the prime responsibility of the R.F.O. to ensure that round officers and guards carry proper patrolling of the forests. He should endeavour to inspect a specific portion of the beats covering at least the 1/4th area of the beat once in six months and report should be punctually submitted to the Deputy Conservator of Forests. In case of extensive illicit felling he will take prompt measures to inspect the beats thoroughly.

11.20.1.6. GAZETTED OFFICERS : Gazetted Officers, during their tours, must inspect specific areas vulnerable to illicit felling. At least one day in a fortnight should be devoted to check the illicit fellings, apart from normal inspection.

SECTION: 11. 21 : CHARCOAL KILNS :

11.21.1.1. No permission to manufacture charcoal to the private persons will be given in the Reserved or Protected Forests or in private areas upto 1 km from the boundaries of the forests.

SECTION: 11. 22 : PRESERVATION OF WILDLIFE :

11.22.1.1. The distribution of wild animals and birds has been given in Chapter VII of Part I. The protective staff will take adequate measures to protect the wildlife also. The following prescriptions will be followed for the conservation of the wildlife.

i) While preparing the treatment map of a coupe for felling in any of the working circles, potential habitat for the wildlife and existing waterholes will also be identified and will be shown on the treatment map.

ii) The details of riparian habitats along various nalas will be prepared along with the treatment map.

iii) Marking of dead, windfallen and malformed trees in any felling coupes will be done only if their number is more than 2 tree/ha. These two trees will act as snags and den trees for nesting and resting of the wildlife. Trees of commercially low utility may be used for this purpose.

iv) During harvesting, some unsound and hollow logs, of commercially low utility, not exceeding 3 per ha will be left in the forest to serve as shelter for the wild animals.

v) In the plantations few trees of fruit species like gular and other ficus species will also be planted to provide food to the wild animals.

vi) The waterholes which are visited most frequently by wild animals will be prohibited from grazing by making a special mention of such areas in the grazing permit licence.

vii) Suitable locations will be identified where forest tanks can be constructed to provide water to the wild animals.

viii) Efforts will be made to inoculate the cattle grazing around the waterholes.

ix) A vigilant watch will be kept on poachers also at the checking gates erected to check/prevent the illicit transport of forest produce.

x) The labour camps and transit depots will be established away from the high wildlife density areas.

xi) Hoardings on the importance of wildlife and its protection will be exhibited at strategic locations.

xii) The provisions contained in the Wildlife (Protection) Amendment Act, 1991 will be enforced rigidly.

xiii) With the tree enumeration programme, the presence of wild animals, their kind and location etc should also be recorded so that the status and location of a particular species of wild animals could easily be identified and accordingly appropriate prescription could be given.

xiv) Annual census of the wild animals should be conducted and recorded.

SECTION: 11. 23 : MEDICAL FACILITIES :

11.23.1.1. Medical facilities in the tract dealt with is adequate. However, most of the forestry works are in the interior and therefore, at all working sites there must be a first aid box with common medicines. The list of medicines and suitable instructions for administration of medicines shall be obtained from the Civil Surgeon of the District.

SECTION: 11. 24 : TRANSIT RULES FOR FOREST PRODUCE :

11.24.1.1. The transit of forest produce is regulated as per the Bombay Transit of Forest Produce Rules, 1960, which are published by the Agriculture and Forest Department under No. IFA-1057/22947-(VI)-J, dated 23rd April, 1960.

11.24.1.2. The Government of Maharashtra vide Notification No. TRS/1083/91822 (ii) CR-87-F-6, dated 13th May, 1985 has amended Section 61 of Indian Forest Act, 1927 making the law more stringent. It has authorised certain officers to be called as authorised officers for the purpose of this Act, who will be competent to confiscate the vehicle involved in offence related to the illicit cutting, removal of timber and firewood and other notified forest produce.

11.24.1.3. To facilitate the issuing of passes, the Government vide TRS/ 1089/ PK/ 267 / 89/ F-6 , dated 14th May, 1990 has stated that the decision regarding the issue of passes, to an applicant should be taken within 45 days of the submission.

SECTION: 11.25: RAIN GAUGE AND TEMPERATURE RECORDING CENTERS :

11.25.1.1. The temperature recording at range level is essential and rainfall recording at round level is necessary. Therefore, it is proposed that rain gauge should be established at each round head quarters and temperature recording instrument should be established at each Range Headquarter. Automatic/self recording rain gauge has been devised by Empire Industries, Roorkee from which it can be procured.

SECTION: 11. 26: SAW MILLS :

11.26.1.1. The following are the rules regarding Saw mill given in Bombay Forest Rules, 1942 revised from time to time.

11.26.1.2. PROHIBITING CONVERSION OF TIMBER WITHIN CERTAIN DISTANCE OF FOREST :

(i) Within the limits of any Reserved or Protected Forests (whether in charge of the Forest or Revenue Department) or of any land in respect of which a notification under section 4 of I.F.A. 1927 declaring that it has been decided to constitute such land as Reserved Forest has been issued, and within one mile of such limits, no person shall establish a saw pit for cutting or converting of timber or manufacture charcoal without the previous sanction, in writing, of the Range Forest Officer.

(ii) Within the limits of any Reserved or Protected Forests, or of any land referred to in clause and within 80 km of such limits, no person shall erect or operate any machinery or saw mill for cutting or converting of timber, without obtaining a licence in that behalf.

Any person desiring to establish a saw-pit or to manufacture charcoal under clause (i), or to erect or operate any machinery or sawmill under clause (ii), of sub-rule (1) shall make an application in that behalf to the Range Forest Officer and the Divisional Forest Officer, respectively. Provided that where within a period of one month from the date of application the applicant fails to receive the sanction under clause (i) of sub-rule(1), the applicant may proceed to establish the saw-pit or to manufacture charcoal, but not so as to contravene any of the provisions of the Act or any Rules made thereunder.

On the receipt of an application under sub-rule(2), the Range Forest Officer, or as the case may be, the Divisional Forest Officer shall make such enquiry as he deems fit and after satisfying himself

on the question whether or not there would be any objection to granting the sanction or licence applied for, having regard to safeguarding the timber in any Reserved or Protected Forests or in any land referred to in sub-rule(i), may grant the sanction or licence in the form of Schedule-E subject to the conditions set out therein, or refuse to grant the sanction licence.

Every licence granted or renewed under this rule shall, subject to the provision contained in this rule regarding cancellation, be effective for a period not beyond the 31st day of December from next following the date of its issue or renewal.

The divisional Forest Officer may, on application made to him, renew the licences issued under sub-rule (3) with effect from the date of its expiry.

An application for renewal of a licence shall be made before the expiry of the period of the licence and failure to renew will render the licensee liable to punishment for operating the saw mill without a licence.

Notwithstanding anything contained in the foregoing sub-rules, the Divisional Forest Officer may, where he has reason to believe a licensee is operating the saw mill in contravention of the provisions of these rules and conditions of the licence or the licensee is indulging in activities prejudicial to the interests of the forest conservancy, at any time, revoke the licence granted under this rule.

Where the Divisional Forest Officer refuses to issue, or renew, or revokes, a licence granted under this rule, he shall do so by an order communicated to the applicant or holder, as the case may be, giving reason in writing for such refusal or revocation.

Any person aggrieved by an order made under sub-rule(8), may, within thirty days of the service on him of the orders, appeal to the Chief Conservator of Forests who shall decide the appeal after giving such person and the Divisional Forest Officer making the orders, an opportunity of being heard, and the decision of the Chief Conservator of Forests shall be final.

Nothing contained in this rule shall apply to the ordinary operations of domestic carpentry or to other similar work on a small scale.

Subsequently, the Government issued amendments from time to time. Vide Notification No.SWM 1081/106836-F-6, dated 16th July, 1981, the State Government put a ban on issue of new licence. However, if the applicant has already spent the money and completed the formalities, the licences can be issued vide SWM 1081/106836(A)/F-6, dated 18th August, 1981. The licence of saw mill can be suspended for three months. Saw mills are required to maintain three registers by the Government Orders No. SWM-1082/CR-20/F-6, R & F.D., dated 22nd February, 1984 in F.No., I-Nintake, F.No.2 - out-turn, F.No.3-disposal. Vide SWM 1082/2590/CR195 /F-6, dated 17th December, 1986, now saw mill can operate after sunrise to sunset without the written prior permission of the Divisional Forest Officer. The Government vide letter No.TRS 1081/102380/F-2, R & F.D., dated 18th July, 1981 has laid down the inspection norms of saw mills by the officers of various ranks. The Range Forest Officer is to inspect - twelve, the Asstt. Conservator of Forests-6, the Divisional Forest Officer-3 and the Conservator of Forests-1 saw mill in a month.

Section 129 Bombay Forest Rules, 1942 states that who so ever contravenes the provision of Rule 88, shall be punishable with imprisonment for a term which may extend to six months or with fine which may extend to five hundred rupees or both.

SECTION: 11. 27 : CAMPING SITES :

11.27.1.1. No camping site for the harvesting purpose or for any other purpose should be permitted within half a kilometer radius of the existing waterholes. The exhaustive list of such waterholes shall be prepared and maintained at divisional level and the copy of the same

shall be provided to the Deputy conservator of Forests, Working Plans - II, Chandrapur for record.

SECTION: 11. 28 : SOCIO - ECONOMIC DEVELOPMENT :

11.28.1.1. To ensure a proper environmental and ecological balance, it is essential that the cultural survival and socio-economic well being of the local people is well taken care off. Unless it is done all attempts aiming at protection and management of forests shall be futile. Thus to ensure this, it is essential that the social and economic stability of the local people through forest based industries/programme, safeguarding their genuine domestic needs for forest produce like bamboo, firewood and constructional timber, is under taken by the forest department. All activities of Non Timber Forest Produce enshrined in Non-Timber Forest Produce Working Circle will be set up for local people through forest department. Besides, the local people can also be encouraged for collecting other Non Timber Forest Produce which have not been covered under (NTFP) Working Circle. However, all developmental activities are being shattered by the population explosion. Therefore, the success of these activities depends on the control of population. Besides, all basic needs of the people directly or indirectly depend on natural resources, most important of them is forest. Therefore, the prerequisite for development is to have forest in healthy condition. There should not be any activity in the name of development which is directly or indirectly tending to destroy or degrade the forest. As an example, a few activities which are detrimental to the forests are given as below :

i) Providing subsidised Gobar gas plant is encouraging people to rear more number of cattle to make available cow dung as raw material for running to Gobar gas. Since people do not follow stall feeding and send their cattle in the forest, the grazing pressure is increasing day by day and this excess grazing pressure is destroying forests, which is undisputed fact.

ii) Upgrading roads passing through the forest is helping and will be helping offenders in doing illicit felling and facilitating transportation of illicitly cut material fastly. Since protection staff, being in very small number and without any fast moving vehicles and weapons, are unable to combat with this problem.

iii) Development of agriculture : The area on hills is undulating. People are small farmer and therefore, area is in small pieces. Productivity is low. Area is very prone to soil erosion and therefore, intensive soil working leads to heavy soil erosion. Besides, almost all plain villages are having malguzari tanks, locally known as “Bodi”. These are perenial source of water and very potential for irrigation and drinking water. Developing these the problem of water supply to villages can be solved. Instead of developing these tanks, constructing large and medium irrigation projects by engulfing very large forest area is not justified. Construction of such dams gives rise temptation in the people to have more land holding, around dams and for quenching it the chance of encroachment increases sharply.

11.28.1.2. In hilly areas, the local people usually take coarse grains from their agricultural field, that too, very few number of grains. The required quantity is also not much, which can not be supplied from outside and so doing agriculture is not indispensable proposition. Since production of agriculture crop is not essential to feed these people and therefore, giving thrust to develop agriculture by destroying forest in hilly areas and becoming permanent threat to the destruction of forest is not wise step. To get food all should cultivate is not necessary. The important thing is that the people should have purchasing power. If the purchasing power of the people residing on hills is enhanced, all will live happily provided population is controlled and stabilized.

SECTION: 11.29: SUGGESTIONS FOR IMPROVEMENT IN DEVELOPMENT :

11.29.1.1. Following are indispensable components / factors of development :

i) **FAMILY PLANNING:** This is prerequisite for any development People should be educated and motivated through repeat talks and other knowledge imparting means. In most of the cases , birth of the first child, gap between children and the number of children

are not controlled. Usually people commits mistake in this regard and that too due to lack of complete knowledge of the subject .Therefore, people should be equipped with complete knowledge of the subject. Therefore, people should be equipped with complete knowledge of family planning and then they should be motivated for adopting it by convincing them its merits as against demerits. In this regard following decision should be taken in each village by the people on discussing the issue:

a) First child only after 3 years of marriage. Prevention of child birth should be done preferably through non chemical means. All such means should be taught to both male female separately by male and female doctors.

b) First child in a family only when the youngest member of the family is more than 5 years old.

c) Birth of a child in a given village should be thought against death of some one in one village.

If this is adhered to, the village will be happiest village and all developmental activities will bear golden fruit. In this the forest department will be of great help as officers of this department usually make frequent visit even of the interior most villages.

ii) BASIC NEEDS AND THEIR FULFILMENT: This basic needs of the people, in general, are “Roti, Kapra Aur Makan”. Local people residing in interior forest know Bhakhari and coarse Rice as main food, moha tori as edible oil. Moha flowers as sweet dish. Analyzing the ingredients of their food we thank nature who made them so resistant. In edible oil they consume excess amount of acid which is health hazardous. In many areas people do not wear much cloth due to non availability which has become their tradition and culture. This is the poor state of living despite many efforts of the Government. All development agencies should work under single department which has rural base. The forest department will be the most suited for this purpose. All activities of development should be for development of natural resource i.e. forest and through which their purchasing power should be increased. For this, some light has been thrown in NTFP working circle. On increasing purchasing power, sustained supply of good quality food materials from outside should be ensured. Besides, efforts for refinement in their traditional food should also be made so that it could become free from health hazardous ingredients. Essential cloth should be given on ration card. So far as building is concerned, it is undisputed fact that building with attached roof provided the effect of air condition. Therefore, well planned buildings of grass, bamboo and poles should be thought of good thatching lasts more than 5 years without repair. Providing tile over thatching will add another 10 years life to the building. All efforts should be made to make drinking (pure) water available. For health care “Vaidus” should be made more educated so that by way of health care practices medicinal plants which are hidden natural wealth could be saved.

iii) EDUCATION: This is most important factor of development. Due to uncontrolled population, what we are doing is that “Ashram Shala” is being provided for their education. This again isolate tribal people. They could not get chance to come in the main stream. They remained shy and their all round development could not take place. The constitution of India enthrines reservation for these SC & ST people to bring them in main stream. But unfortunately the real poor are still not enjoying fully this facilities due to low educational level. Higher services are beyond their reach. Only a counted families are enjoying these reservation facilities. To make it available to the poor persons, the economic criterion among themselves should be applied. Besides, the educational pattern should also be changed to enhance their mental status. Instead of Ashram Shala, there should be centralised education at District level providing residential facilities to rural people. In education there should not be compartmentalization. If the population is controlled every thought could be translated to reality.

iv) LIGHT : Light should be provided to villages. The maintenance of power supply is very poor and therefore, some modified system of power supply such as underground cable, should be thought of. Underground supply will solve the problem of forest destruction as well. The maintenance problem will also be less.

v) ROADS : Each village should be connected by roads but roads passing through forest which is vulnerable to illicit cutting should not be upgraded. All weather road will also solve the problem. In villages, the main transporting vehicle is bullock cart for which tar road is not essential. Road construction should be avoided if it is detrimental to the forests.

11.29.1.2. CHANGE IN LEGAL PROVISIONS :

a) Efforts should be made to make amendment in IFA, 1927 with regard to section 61, in which the word “notified forest produce” should be replaced by “Forest Produce” or by issuing notification all forest produce should be brought under the preview of section 61.

b) Efforts should be made to establish forest court, chaired by IFS officers for quick disposal of forest case and to give judicious decision. Presently some courts are taking forests offence seriously but move very lightly. Forest officer can judge correctly the gravity of the case.

11.29.1.3. RESEARCH : There are so many Non Timber Forest Produce in the forest which are undefined and untapped. Efforts of the department should be to explore them and manage them scientifically. The identification of medicinal plants is the field to be taken for study immediately. This has wide scope in future. Dr. M.N. Padhye of Nagpur and his team have been conducting survey of medicinal plants in the forests of Gadchiroli and Chandrapur Districts. Over 150 such plants have been identified so far. The list of plants will be given in Appendix of dwpr. This is not the exhaustive list of medicinal plants. It is open to add more names of such plants. Besides, quantification and localization of the same are the fields for future study. Innovation and research works should always be carried out and the same be recorded and reported properly so that those could be of use to those who come next.

11.29.1.4. Nursery technique for miscellaneous forest species should be developed. Presently we are very poor in it. Besides, experiments should be carried out for establishing natural regeneration of different species. The effect on natural regeneration by controlling grazing, fire and weeds should be experimented. The roles of micro organism, wild animals, herbs, shrubs in development of forest are required to be known and documented so that people could give the importance to them along with tree species. Due to lack of knowledge, the forest officers are not understanding well this relationship and therefore, we tend to commit mistake by raising the voice for separating wild animals from forestry. In fact there are a number of organisms and plants in this eco-system and they all have some relation among themselves. Therefore, existence of all is required for balanced eco-system.

CHAPTER – XII

ESTABLISHMENT AND LABOUR

SECTION : 12.11: STAFF :

12.1.1.1 The details of staff have been given in Chapter IV of Part I of this plan. The existing ranges, round and beats have been given in Appendix no. III.

12.1.1.2. The existing staff and set up is adequate for the management of the forests. However, being the protection, pressure, deployment of additional staff to protection works requires to be done. For mobility, the staff is poorly equipped. At least mobile squad R.F.O. should be given independent jeep for better mobility. Checking naka from Junona site at proper place is required to be erected. Near Ballarshah some criminal gangs are operating. To deal with them police assistance of permanent nature is required.

SECTION: 12.2: LABOUR SUPPLY :

12.2.1.1. Normally there is no problem so far as labour is concerned. Labourers are easily available. There was problem with EGS works as wage rate was less. But this problem has been lessened by enhancing EGS wage rate too. To lessen the labour pressure and to get good quality of works modern mechanical methods should be adopted. Efforts have also been made to scatter the works uniformly over the whole tract to overcome the chance of labour problem.

CHAPTER – XIII

CONTROL AND RECORDS

SECTION :13. 1 : CONTROL AND RECORDS :

13.1.1.1.The following will be maintained in the division office :

- i) Control Form
- ii) Compartment History
- iii) Plantation and Nursery Registers.
- iv) Divisional Note Book.

13.1.1.2.CONTROL FORM : The record of all harvesting, subsidiary cultural operations, regeneration works and soil and moisture conservation works carried out as per the Working Plan prescriptions, will be maintained in the control forms. The prescribed proforma of the following control forms will be given in Appendix no. XXXII.

13.1.1.3. Two sets of control forms will be prepared. One set will be kept in the divisional office and the other set will be the flying set for the use of the D.C.F. Working Plan. The flying set will be sent annually by the D.C.F. Central Chanda division, to the D.C.F. Working Plan not later than October 1 every year taking the necessary entries. All entries showing the deviations from the prescriptions will be underlined in red. The D.C.F. Working Plan will scrutinise it and will send it to the territorial C.F. along with his remarks to the C.F. Working Plan, Nagpur not later than February 1 of the following year. The Conservator of Forests, Working Plan in turn will forward them to the Add. Principal Chief Conservator of Forest for perusal and orders where required.

13.1.1.4. Conservator of Forests Territorial will ensure that the required Control Form is being maintained as stipulated above by Office Inspection of DCF.

13.1.2.1.COMPARTMENT HISTORIES :Compartment histories i.e. the record of various forestry activities and observations made in the past year, will be maintained in form nos. 1 to V as shall be given in the Appendix no. XXXIII.

Form I : Description of the Compartment.

Form II : Records of plantation and changes in the growing stock.

Form III : Records of operations and out-turns.

Form IV : Records of observations.

Form V : Records of injuries.

13.1.2.2.Each compartment must have a separate file for its records. Compartment histories must be maintained by the division since they keep the record of past management practices and their effects on the growing stock.

13.1.2.3.Every year, in July, the Range Forest Officer should fill in the necessary information and will send it to the Dy. Conservator of Forest Central Chanda division for scrutinising, editing through the concerned Asstt. Conservator of Forests, who after doing so, will get them typed and sign them. One copy of the forms will be filled in the divisional compartment history file while one copy each will be sent to the Range Forest Officer and the Dy. Conservator of Forest, Working Plan Division in the month of August.

13.1.2.4. DCF Territorial will ensure that the required Control Form is being maintained as stipulated above by Office Inspection of RFO.

13.1.2.5. PLANTATION AND NURSERY REGISTERS : Plantation registers will be maintained for all the areas regenerated artificially in the Form Nos. 1 to 9 as shall be given in the Appendix. of. in Volume II. Nursery registers will be maintained in Form Nos. 1 to 10. These forms shall be given in the Appendix no. XXXIV & XXXV

13.1.2.6. DIVISIONAL NOTE BOOK : The matters of divisional importance will be recorded under standard headings for records and ready reference in the divisional note-book.

A brief note of the plantations will also be recorded by the Dy. Conservator of Forest Central Chanda division under the appropriate heads. The form of Divisional note book shall be given in the Appendix no. XXXVI

R/Sur
C.F.W.P. DN. YAVATMAA

18 NOV 2004

प्रति.

प्रधान मुख्य वनसंरक्षक, महाराष्ट्र राज्य, नागपूर यांचे कार्यालय.

In word

४५५

Date- १८/११/०४ नागपूर- ४४०/००६, दिनांक ०८/११/०४

Sec.

वनसंरक्षक

उत्तर चंद्रपूर वनवृत्त.

चंद्रपूर

विषय- मध्य चोंडा वनविभागाच्या कार्य अयोजनेस मंजूरीबाबत.

संदर्भ- केंद्र शासन, पर्यावरण व वन मंत्रालय, भोपाळ यांचेकडील पत्र
क्रमांक १२-१०/२००२(एफओआर)/१३६८, दिनांक २५/१०/२००४.

मुख्य वनसंरक्षक (केंद्रीय) पर्यावरण व वन मंत्रालय, भारत सरकार, भोपाळ यांचेकडील पत्र क्रमांक १२-१०/२००२(एफओआर)/१३६८, दिनांक २५/१०/२००४ अन्वये मध्य चोंडा वनविभागाच्या कार्य अयोजनेस पत्रात ये दर्शविलेल्या अटीच्या अधिन राहून मंजूरी प्रदान करण्यात आलेली आहे. केंद्र शासनाने नमूद केलेल्या अटीची कठोरपणे अंमलबजावणी करून पालन करावे. सदर पत्राची प्रत पुढील आवश्यक कार्यवाहीसाठी सारोबत पाठविण्यात येत आहे.

सहपत्र - तारीखप्रमाणे

अपर प्रधान मुख्य वनसंरक्षक
(उत्पादन व व्यवस्थापन)
महाराष्ट्र राज्य, नागपूर, किरला

प्रतिनिधी - मुख्य वनसंरक्षक, (कार्य अयोजना), नागपूर ह्यांना सहपत्रासह माहीती व आवश्यक कार्यवाहीस अग्रेषित.

प्रतिनिधी- वनसंरक्षक, कार्य अयोजना विभाग- २, चंद्रपूर ह्यांना सहपत्रासह माहीती व आवश्यक कार्यवाहीस अग्रेषित.

प्रतिनिधी- वनसंरक्षक, कार्य अयोजना विभाग, यवतमाळ ह्यांना सहपत्रासह माहीती व आवश्यक कार्यवाहीस अग्रेषित.

प्रतिनिधी- उत्तरवनसंरक्षक, मध्य चोंडा वनविभाग ह्यांना सहपत्रासह माहीती व रचना.



भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण एवं वन मंत्रालय
MINISTRY OF ENVIRONMENT & FORESTS

क्षेत्रीय कार्यालय, पश्चिमी क्षेत्र
Regional Office, Western Region,

केंद्रीय पर्यावरण भवन

Kendriya Paryavaran Bhavan

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तार/Telegram: CENTFOREST

ईमेल/E-mail: rccfwr@sanchamnet.in

Dt-25-10-2004

No. : 12-10/2002 (FOR) 1968

To,

The Principal Secretary,
Revenue and Forest Department,
Government of Maharashtra,
Mantralaya,
MUMBAI.

Sub: Approval of Working Plan of Central Chanda Forest Division, for the period from 2004-05
2013-14.

Ref: Government of Maharashtra letter No. Msc.2004/CR-137/F 2 dated 12.8.04.

Sir,

With reference to the above mentioned subject, I have been directed to inform you that after careful examination of the Working Plan of the Central Chanda Forest Division, the Central Government hereby conveys its approval to the said working plan in accordance with the powers vested under Forest (Conservation) Act, 1980 subject to following conditions:-

- (1) Currency of the Working Plan shall be for 10 years i.e. from 2004-05 to 2013-14.
- (2) The orders of Hon'ble Supreme Court passed in W.P. (Civil) No. 202 of 1995 in the matter of Godaverman Therumalkpad Vs Union of India and orders passed in interrelated Inter Locutory applications shall be strictly adhered to. Any prescription or operation at variance with the Hon'ble Supreme Court's order shall be kept in abeyance till the order is in force or otherwise modified.
- (3) Further, orders of Hon'ble Supreme Court's dated 22.09.2000 in Interlocutory application No. 424 shall be complied with by ensuring that regeneration of forests is commensurate with fellings carried out under this working plan. To achieve this it must be ensured that no felling be carried out without allocating necessary funds to regenerate the felled area. In the event of failure in regeneration or any shortfall in carrying out regeneration operation, no further felling shall be undertaken until the failure/shortfall is made up.

Following the directions of the Hon'ble Apex Court in their order dated 22.09.2000, in IA No. 424, the instructions/ directions of the Core Group constituted to decide the extent of felling or any direction of Central Government shall be strictly complied with and felling is to be done by State Government only after obtaining permission from Core Group constituted by the MoEF, New Delhi.

- (5) No forests bearing naturally grown trees shall be clear felled for any purpose whatsoever
- (6) Since the details of P.O.Rs are not given the list of encroachers is not approved. The State Government shall examine this list in view of annexure-IV of Forest (Conservation) Act, 1980 Rules & guidelines
- (7) Compartment wise break up of 20385.323 ha area encroached, shall be incorporated in the working plan and the information shall also be submitted to this office within six months of the issue of this letter
- (8) All unauthorised encroachments from forest land shall be removed and the areas thus evicted shall be rehabilitated in a time bound manner and progress in this regard shall be reported to this office every year by the State Government.
- (9) A list of proposals approved under the Forest (Conservation) Act, 1980 shall be appended in the working plan
- (10) Yearwise and working Circle-wise details of estimated expenditure on the working plan prescriptions on the lines of that given in the working plan of Nagpur forest division shall be incorporated in the working plan
- (11) Adequate funds for implementation of prescriptions under the working plan including boundary demarcation as worked out in compliance to condition No. 10 stipulated above shall be made available by the State Government to the Forest Department.
- (12) Prescriptions of micro plans for JFM should conform with the broad framework/guidelines of the Working Plan and shall be in accordance with Forest (Conservation) Act, 1980 and various orders of Hon'ble Supreme Court.
- (13) Felling carried out on forest land after seeking approval of the Central Government under Forest (Conservation) Act, 1980 will not be treated as deviation. However, proposed felling in the forest division shall be restricted proportionately in the current/following years to compensate his removal
- (14) All kinds of fellings including that of dead, dying and diseased trees and for granting of rights and concessions as well as all illicit fellings should be compiled alongwith the estimation of their sizes and volumes as per the same volume table used for assessment of growing stock. This report shall be prepared annually Working Circlewise and Compartment wise by the territorial DFO and shall be submitted to the C.F., Working Plan within two months of the end of control year in a proforma, to be designed by the C.F., Working Plan for this purpose. Such removal shall be accounted for against the prescribed felling yield of the relevant year.

3

5) No deviations shall be made from the prescriptions of working plan read with the conditions stipulated herein without prior approval by the Central Government under Forest (Conservation) Act, 1980. Deviation for excess yield in any Working Circle by more than 10% of the approved yield/fellings of that year, will also be submitted to this office for approval. However, deviations of positive nature i.e. out of turn plantations carried out outside the worked area under any project, schemes and compensatory afforestation may be approved by the competent authority of the State Government.

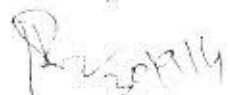
6) The Central Government reserves the right to review, modify, withdraw this approval at any time if any of the conditions of approval are not implemented or relevant modification in the working plan is required so as to keep it in conformity with the orders, circulars and guidelines issued by the Central Government or the Apex Court under Forest (Conservation) Act, 1980 or any other statute and National Forest Policy.

Yours faithfully,

(Dr. S.P. Srivastav)
Conservator of Forests (Central)

Copy to

The Additional Director General of Forests (FC), Ministry of Environment and Forests,
Paryavaran Bhawan, C.O. Complex, Lodi Road, New Delhi - 110 003.
The Principal Chief Conservator of Forests, Govt. of Maharashtra, Seminary Hills, Nagpur
The Divisional Forest Officer, Central Chanda Forest Division, Chandrapur, Maharashtra


(Dr. S.P. Srivastav)
Conservator of Forests (Central)